Pediatrics

VOLUME 2 AUGUST 1948 NUMBER 2

ORIGINAL ARTICLES

THE PSYCHOTHERAPEUTIC ROLE OF THE PEDIATRICIAN

By MILTON J. E. SENN, M.D.

THE pediatric literature of this country has always been eclectic. In the past few years it has drawn increasingly on material from a variety of sources relating to the psychologic aspects of child care. The number of papers in pediatric journals on child psychology, deviant behavior and mental illness, mental growth and development, psychiatric treatment, sociology, and even anthropology bears witness to this occurrence. Another testimony to the pluralism of pediatric interest is evidenced in the composition of the program of this meeting where one series of papers is devoted to the topic of psychiatry in relation to pediatric practice. In the training of the pediatrician emphasis is also placed on preparation of the physician for multiple and changing roles in work with children and their parents. From the fields of psychology, psychiatry, education, and that less easily classified area which is called "growth and development," the pediatrician is advised how to make pediatric practice more effective through the use of technics which have been found useful in each of these disciplines. For example, the pediatrician is urged to become acquainted with the facts of growth and development so that as a "developmental pediatrician" he may predict and interpret behavior of children to their parents; and, along with proper understanding of the parents, may relieve their hopes, fears and mental conflicts.

In another instance, the educator admonishes the physician to follow him in the use of pedagogic guidance. Still another example may be cited from the field of modern psychiatry where the pediatrician is urged to employ such technics as suggestion, persuasion, reassurance, re-education, desensitization, ventilation and a long list of other psychotherapeutic methods which on the surface appear less formidable and more

---

From the New York Hospital and the Department of Pediatrics and Psychiatry, Cornell University Medical College, New York 21, N.Y.

Read at the meeting of the American Pediatric Society and the Canadian Society for the Study of Diseases of Children, Quebec, May 24, 1948.

(Received for publication May 28, 1948.)

understandable than many of the words used in psychiatry, but which, nevertheless, need definition and clarification before anybody is able to use them safely in a therapeutic sense.

Psychiatry, pediatrics, psychology and education have made contributions to the field of psychotherapy. Representatives of each of these disciplines have attempted to evaluate the essential ingredients for successful treatment. Although each may credit specific technics, tools and methods from their respective professions, one wonders if the constituent principle held in common by each of these skilled persons may not depend on a common factor which lies beyond the technics and methods expounded. Many times in the literature exponents of each of the aforementioned disciplines emphasize impersonal factors as the effective agents which in the hands of the pediatrician, psychiatrist or educator are considered the important essentials influencing the attitudes of children and parents and modifying their feelings. Some who are recognized as expert technicians, fail in their attempts, in spite of procedures which are skillfully executed. One may conclude that emphasis on doctrine or mode of procedure alone is not only ineffective but may be potentially harmful. Such an approach to mental hygiene and preventive psychiatry may become so impersonal that it has the characteristics of laboratory appraisal reminiscent of an era of scientific advance in this country when in medical diagnosis and treatment emphasis was placed on the usage of instruments of precision to the near exclusion of evaluation by human and personal agents. In describing the requisites of the modern doctor, Abraham Jacobi[1,2] once said, "The best instrument of precision after all—please remember—is that which you carry in your skulls. It is your brain that should direct your heart as it is your heart that should warm your brain." In searching for the essential ingredient in the therapeutic process by careful analysis of the methods advocated, or by observing the therapist as he uses the tools of the developmental pediatrician, the teacher, or the psychiatrist, one discovers that what is important is personal and involves a process in the interpersonal relationships between the patient, or student and the therapist. It is the purpose of this paper to appraise the nature of these interpersonal relationships and to emphasize that successful psychotherapy requires from the therapist a highly personal and individual orientation and regard for the individual which goes beyond any particular theories which may be followed.

In order to understand the relationship of physician and patient and the psychologic interplay between them, one must begin by assessing the psychologic and social roles of these persons. In our culture, the physician is regarded as a person of wisdom, perhaps even of magical power; is considered trustworthy and for that reason he becomes the repository of secrets about irregularities in life, marital and sexual difficulties, and problems which cannot be shared with anyone else. He is expected to supply unbiased guidance and advice which is free from censure and capable of practical application. Although trusting, the patient comes to the relationship with fear and anxiety in almost every instance. He may cloak this fear with exaggerated courage or through the expression of doubts and even criticism. Coming for help to a physician carries with it traditional preconceptions which are of mixed quality. On the one hand there is trust, expectation of being helped, more or less willingness to accept help, while countrariwise, there is fear, doubt, and a feeling of inadequacy. Such attitudes and feelings, although they may be less apparent in children than in adults, nevertheless operate even in young children and may serve as aids or hindrances in bringing about a good therapeutic rela-

tionship with the pediatrician. This thumbnail sketch of the patient's appraisal of his physician and of the attitudes the layman presents is but one side of the picture in the physician-patient relationship. For contrast, description of the pediatrician's concept of the essential elements of his role as a therapist should be presented.

The physician might begin with an appraisal of himself, listing such attributes as intelligence, skill, good judgment, capacity for acquiring and using scientific knowledge, and many others; but it is natural to assume that before long he will come to the realization that first on the list should appear qualities of character and personality which permit the establishment of what is called confidence, faith or rapport. Like Robert Burton in his essay, "Anatomy of Melancholy," the discerning physician will unquestionably rank confidence in the physician "before art, precepts, and all remedies whatsoever."

The question may be asked, "How does a physician instill confidence in a patient?" And again, "How is rapport maintained after confidence has been established?" Medical psychology, particularly the psychoanalytic school, has demonstrated that the first requisite in the development of a therapeutic physician-patient relationship lies in the ability of the physician to be aware of the feelings that the patient brings, and to be able to accept these feelings whatever may be their nature. It is in the initial period of treatment that the approach of the physician determines the character of the relationship. Following the pattern of all medical practice, the patient presents his complaints and problems and the physician is expected to institute a program of active management. It is expected that he will offer advice, explanations, guidance, assurance, and at least a prescription, when whatever is of therapeutic value will flow out of the relationship at the onset. Actually, in order to help the patient it is neither necessary nor desirable in every instance to offer anything more than opportunity for the establishment of a relationship. In the beginning of treatment the physician is an observer, interested in his patient and particularly the feelings that he brings with him. Some of the attitudes and emotions in the parent and in the child* who is brought to the pediatrician have already been mentioned. The important thing is not whether these feelings are positive or negative but rather how the pediatrician is able to allow the patient to *experience* these emotions in the time spent with him. Once the patient has had the experience of being accepted and understood, he begins to develop trust in the physician; the ever present anxiety which he brings becomes less in time and the helping process has started before any specific remedial procedure has been offered. It may be said that the therapeutic situation has been established when the patient has succeeded in identifying the physician as a reliable and trustworthy person.

Successful treatment is further insured when the physician is aware of the continuing interplay of reaction between him and the patient. The patient wants understanding, information, clarification of misconceptions, and even absolution but enters the relationship with an ambivalent attitude—on one hand trying to take help, on the other hand guarding against receiving help. This two-way attitude of people coming for medical help is one which many physicians are unable to recognize and, hence, unable to accept. To them it seems contradictory that any person should have such strong mixed feelings when in need. From psychiatry comes the knowledge that some of these feelings of unwillingness

* Although the child is usually the focus in pediatric practice, in most instances the parents must be considered as component parts of the patient constellation. In this paper the word *patient* is used to designate any member of the family with whom a therapeutic relationship is established.

to be changed are unconscious and it has been shown that the patient tries repeatedly in his relationship with the therapist to test him out, thereby reliving again earlier relationship experiences, particularly the parental patterns in their authoritative and frustrating aspects on the one hand and those of gratification on the other. In essence, the patient is trying repeatedly to create a situation in which the physician will provide a maximum of gratification in exchange for a minimum of frustration. An analysis of the presenting complaints with which patients start their interviews brings forth evidence in this regard. It is not uncommonly seen that the so-called "chief complaint" soon disappears as the patient is permitted to talk and its place is taken by a problem which is more primary and which for some reason or other, possibly fear, was temporarily concealed either consciously or unconsciously so that the patient could not recognize the problem which was first in order from that which was second and did not permit its expression earlier. As the interview precedes, the patient through talking out often consciously becomes aware of the real difficulty and now with his new insight is in a position to assume responsibility for himself and for the working out of his problems. Where the patient is not ready or able at a particular time to use his relationship because of natural repression or because a response on the part of the physician prevents talking out, therapy will bog down. It is not always easy for the pediatrician on the basis of time and in the framework of therapy to permit the patient to bring out his feelings. Every physician, being a human being, will respond in an individual manner within himself to the presence of each patient. At times he will feel at ease, calm, and relaxed and in these states he finds it easy to accept the patient as he is. In contrast, on other occasions, even with the same patient, he may feel angry, hostile, frustrated, or tense and find the situation almost impossible to bear without bursting out with a word of censure or of criticism. To survive bombardment of patients' demands and needs, the physician must be able to set up a protective coating of his own personality and this should have the characteristics of a semi-permeable membrane in retaining some degree of flexibility and permeability. He must be able to keep himself sensitive and responsive to the needs of his patients, accepting them in their human qualities without becoming engulfed in their distress. Although the presence in the physician of the emotions of anger and resentment may be rational and legitimate, for therapeutic reasons in terms of the patient, he should withhold all demonstration of such feeling. The experiencing of these emotions may be exhausting; but, for therapeutic reasons in terms of himself as well as the patient, the physician must be able to feel with the patient, while remaining objectively apart. In order to achieve such objectivity every physician should have an understanding of the behavior of people under stress and should have an awareness of his own personality so that he recognizes the reasons for his different responses to the diverse emotions of patients. He should be able to recognize ways in which patients make use of him—sometimes as a sounding board for the verbal expression of their thoughts or at other times as a human figure upon whom their feelings may be projected. Not only must the physician, throughout his relationship with the patient, be able to keep his own emotional state in hand; but he must be able to do this by maintaining his own professional identity. This is not easy to do. On the one hand he must guard himself against insensitivity which may take the form of evasion of practical issues, hostility, or the use of theoretical pragmatism; and on the other hand he must guard against bringing into the relationship material from his own intimate,

personal experience in a way which weakens his stature as a professional person. He should be able to be personable without maintaining an attitude of aloofness or one of equal severity which fosters a god-like and magical reverence.

Every physician who has been in practice for any length of time realizes that some patients consistently bring out in him one set of emotions. The reasons back of this may not always be apparent. However, when a physician does become aware of the mechanisms causing him to react as he does to certain individuals or to the same individual at different periods of his life, the therapeutic role is enhanced. An example of this was shown recently with one of our graduate students who brought to his instructor each week the case histories of patients he was treating in the outpatient department. It was soon apparent to teacher and student that whenever the patient was an intellectually retarded child, the student physician became blocked in carrying out plans for treatment—especially when institutionalization seemed the therapy of choice. At one of the weekly conferences the graduate student expressed his concern about his dislike for these children and for his inability to handle them effectively. He mentioned his desire to know why this difficulty was present because as a rule he was easy-going in manner, liked children, and could participate in their care without unusual difficulty. After expressing these views the student suddenly stopped talking, blushed and exclaimed, "I know now. I just thought of the answer." He followed this with an account of his own early life when his parents had been faced with the decision of caring for his feeble-minded sibling and how he had reacted with unhappiness and guilt when this brother, towards whom he had mixed feelings of love and hate since birth, had been institutionalized.

The mechanism of identification is another means whereby parent or child relates himself to the pediatrician by re-enacting with him various relationships which each has had with other persons and which for some reason he now feels need to experience again. One of the most easily recognized examples of identification in pediatric practice is seen many times in infant feeding. One of these deals with early infancy. At the present time there is a revival of interest in breast feeding. It is not unusual today to see an increased incidence of breast feeding in some hospitals where a concerted effort on the part of physicians and nurses is made in this direction. An analysis of the reasons for the upward curve of incidence reveals the fact that various psychologic mechanisms are operative—identification between mother and physician being one of the most prominent. In one hospital the incidence of breast feeding of newborns reaches a peak of 90% to 95% when the service is in charge of a pediatrician who is interested in breast feeding and who is known in the community as a kindly, sympathetic and fatherly person. That his personality is the important factor in the high percentage of breast feeding is shown by the sharp decline in frequency when the service is in the hands of a medical colleague who prefers feeding babies cow's milk. The first physician is so well loved that the mothers admit they try exceptionally hard to nurse their babies. That this is done out of affection, and possibly out of feeling of respect and duty, may be reflected in the decrease in incidence after the mothers leave the hospital and are taken care of by other pediatricians who find no physical reason for inability to nurse except "an absence of milk."

In passing, it may be pointed out that many child care practices are encouraged by admonition or insistence through the spoken or printed word, or indirectly by inference so that mothers feel obligated to follow the recommendations of their physician whether

or not they have within themselves real feeling and belief in the procedure advocated. It is well recognized that child care which is given by a person who follows directions without emotional acceptance of the prescribed practice tends to be ineffective, whether the procedure is one of disciplinary action, feeding or habit training.

In stressing the role of the physician as a person in the process of interpersonal relationships, it has been mentioned that as a therapist he needs an awareness of the feelings, attitudes and of dynamics of behavior not only in the persons who come to him as patients, but also in himself as one who ministers to their needs. It may be asked, whence will come this insight? It is common knowledge that, to some individuals, understanding results from their own experiences as human beings, as part of their own personal growth and development. In psychiatry it is recognized that psychologic orientation comes through personal experiences which one may have as he goes through psychiatric training and is exposed repeatedly to the mental suffering of other human beings. It is also understood that a psychoanalytic experience may prepare a person professionally in this way through the setting up of a relationship in which the physician in a training-analysis undergoes the experiences of a patient. It would be expecting too much of each pediatrician in training that he have either a psychiatric or a psychoanalytic experience. Many of us who are teachers, whether the subject matter be psychiatry, pediatrics or English literature have felt that around the relationship between pupil and teacher there may develop a process which is highly personal and which has all the characteristics of a psychotherapeutic kinship. It is well recognized that true learning is an emotional experience. This comes naturally where the teacher provides opportunity for periodic contact with the pupil so that, through stimulation around his own character, various psychologic reactions in the pupil are permitted spontaneous expression. Such person-to-person communication will activate in each participant the variety of feelings described before in the reactions of the patient and physician. Everyone recognizes examples of such an interplay of personalities in some of our best teaching centers where teacher-pupil ties were so personal that even mannerisms of speech, dress and gait were imitated quite unconsciously year after year by house officers who identified themselves with the "Chief."

It seems logical to conclude that pediatric training, like all educational ventures, to be truly effective must provide ample opportunity for the establishment of intimate teacher and pupil relationships. With these at the core of training, not only will pediatricians learn the fundamentals of child care but they will be able to incorporate quite naturally psychologic insight with medical understanding and so make pediatrics the comprehensive discipline it must be.

References

1. The Modern Doctor, American Medicine, June 10, 17, 24, 1905.
2. Jacobi, A., Medical Addresses, Vol. VI, Edited by William J. Robinson, The Critic & Guide Co., 12 Mt. Morris Park West, New York, 1909, p. 143.

Spanish Abstract

La Función Psicoterapeutica del Pediatra

El pediatra tiene en su practica diaria que desarrollar un papel como psicoterapeuta en la higiene mental y psiquiatría preventiva de los niños y sus padres. Se han recomendado muchas tecnicas y metodas por psicologos, psiquiatristas y educadores para uso de los pediatras en el campo de la medicina psicologica. La conclusion del conjunto de estos factorés impersonales demuestra que el

ingrediente esencial del éxito psicoterapico consiste en un proceso que permite un intercambio de sentimientos personales entre el medico y el paciente. En este trabajo se evaluan las funciones psicologicas y sociales del pediatra.

El autor cree que es imperativo de cada medico reconocerse propiamente como persona, asimismo como el paciente, con el fin de que pueda participar objectiva y terapeuticamente en la relación medico-paciente. Ya que existe una similitud entre esta relación y la relación maestro-alumno, se sugiere que los medicos tienen en su practica amplia oportunidad para relacionarse emocionalmente con los maestros, y de esta forma obtener un conocimiento psicologico con principios medicos, en los fundamentos del cuidado del niño.

525 East 68th St.

PARANATAL FACTORS AFFECTING ADJUSTMENT IN CHILDHOOD

By STUART SHELTON STEVENSON, M.D.
Boston, Mass.

THE association of difficulties at the time of birth and in the first hours of life with neurologic defects in later years has been recognized since Little[1] wrote his treatise on the spastic palsies and suggested asphyxia neonatorum as etiologic. Schreiber[2,3] has described such a sequence and Preston[4] has related serious behavior difficulties, such as epilepsy, to postnatal anoxia. Other references might be cited since the concept is not new. In so far as can be determined, however, no unselected series of children has been followed in an attempt to demonstrate less obvious neurologic defects following paranatal difficulties. Such defects may be more common than is currently appreciated: prenatal care and obstetric practice should be evaluated with this possibility in mind. Some obstetricians and pediatricians seem to assume that if the infant survives the neonatal period without obvious neurologic defect, this is proof apparent that he has come through the birth process unscathed. The newborn infant is essentially a decorticate animal, in so far as his largely reflex behavior is concerned, and serious damage to his cerebral cortex might not become evident for many months. It is dangerous to assume that a newborn baby is unharmed because he appears to be well when he leaves the hospital.

An anatomic basis for some childhood maladjustments does not seem unlikely. Indeed, in 1942, Gallagher et al[5] showed a suggestive relationship between abnormal electroencephalograms and personality difficulties in adolescent boys. With such considerations in mind, an attempt has been made to discover paranatal factors which might affect adjustment in childhood.

METHOD

The records of 226 children have been analyzed. These children were carefully followed in connection with a longitudinal study of child health and development which is still in progress in the Department of Maternal and Child Health of the Harvard School of Public Health. The methods adopted in this comprehensive work have been described in a former publication from this department.[6] The series is unselected. In general, the growth and development of the group were within the usually accepted ranges of normal variations.

Accurate, extensive data are available concerning the mothers' obstetric histories, the neonatal periods, and the mental and emotional make-ups of these children. These data were carefully noted at the time of their occurrence and do not represent haphazard jottings on hospital records.

Each child's general adjustment to his environment, through at least five years of age and in many cases through eight years of age, was rated without reference to other data

---

From the Department of Maternal and Child Health, Harvard School of Public Health.

Presented in part at the joint annual meeting of the American Pediatric Society and the Canadian Society for the Study of Diseases of Children, Quebec, Canada, May 24, 1948.

(Received for publication May 3, 1948.)

concerning him. It should be emphasized that this is not a group of "problem" children or of children under care for notable neurologic defects. There were few cases of serious maladjustment and the mentality of the group was average, as judged by repeated testings. Within such a group of children, ratings of adjustment were difficult to make; they were obtained by a synthesis of the progress notes of psychologists, nursery school teachers, pediatricians, social workers, nurses, and parents' comments concerning the children.* Because of the unavoidable subjective component in such evaluations, they were repeated after a month's interval and 42 instances of disagreement with the first ratings were found. These 42 cases were classified as "medium adjusted"; the remaining 184 cases, where there was agreement, were classified as "well adjusted" or "poorly adjusted."

Each child's general physical condition during the first two days of life was then rated, again without reference to other than neonatal data concerning him, as "good" or "poor," judged by such signs as shock, apathy, vomiting, hypertonicity, and respiratory difficulty. Clinical data relating to neonatal condition were obtained by special examinations conducted within 48 hours after birth by pediatricians who were working in the research project. The distinction between "good" and "poor" seemed clear and the ratings agreed well with a previous set of evaluations of the same series of children which was done several years ago for a different purpose.[7]

Data concerning the child's gestation, birth, neonatal period, intelligence, and family situation were also studied.

Results

Table I shows that 73.9% of the 226 children were in good physical condition during the first two days of life and 26.1% of them were in poor physical condition. Of the children in good physical condition, only 19.2% were later judged to be maladjusted; whereas, of the children in poor physical condition, 39.0% were later considered maladjusted. This is a highly significant difference.

Table II presents five groups of children which were selected from the total series on the basis of certain maternal factors which might be expected to affect the condition of the neonate. It should be noted that these groups are not necessarily independent. The 29 children grouped after "toxemia" were born of mothers who suffered from toxemia of pregnancy, as defined by their obstetricians on the basis of hypertension and albuminuria; there were 11 premature births (birth weights less than 2.5 kg.) in this group.

---

* Each child's record included extensive comments by a psychologist as to the personality traits and adjustment of the child at various ages; these comments were based upon lengthy and repeated observations at health conference visits, in a research nursery school, and at home visits, upon psychologic evaluations, and upon interviews with the child's parents. The progress notes of the social worker were useful because she was familiar with the child in his family and school settings through home visits and repeated interviews. The progress notes of the pediatrician and the comments of the nurse were valuable as spontaneous impressions of the child's personality and adjustment. Consistency was usually evident in all of these sources of information about each child's personality and adjustment.

It is appreciated that psychiatrists might disagree with the author, a pediatrician, as to whether any or all of these children should be considered maladjusted. However, the children who were called maladjusted showed a succession of behavior characteristics, throughout their early years, which are ordinarily considered undesirable and which set these children apart from those called well adjusted.

The 33 children grouped after "maternal disease" were born of mothers who suffered from a variety of conditions; among these were repeated vomiting, severe anemia, cardiac disease, pyelitis, and vaginal bleeding at varied times during pregnancy. The 52 children grouped after "long labor" were born of mothers whose labor exceeded 17 hours in duration; 41 of these were primiparous labors. The 28 children grouped after "abnormal delivery" were delivered by means other than spontaneous vertex or vertex with low forceps; there were six cesarean sections in this group.

The selected groups shown in Table II are too small for detailed analysis. Certain facts

TABLE I

ADJUSTMENT RATINGS OF 226 CHILDREN WITH REFERENCE TO PHYSICAL CONDITION DURING THE FIRST TWO DAYS OF LIFE

	Good Physical Condition (73.9% of Children)		Poor Physical Condition (26.1% of Children)	
	Number of Cases	Percentage	Number of Cases	Percentage
Well Adjusted	104	62.3	25	42.4
Medium Adjusted	31	18.5	11	18.6
Poorly Adjusted	32	19.2	23	39.0
	167	100.0	59	100.0

TABLE II

ADJUSTMENT RATINGS OF CHILDREN WITH REFERENCE TO PHYSICAL CONDITION DURING THE FIRST TWO DAYS OF LIFE: GROUPS SELECTED WITH REGARD TO MATERNAL FACTORS IN GESTATION AND DELIVERY

Basis for Selection	Number of Cases	Percentage of Babies in "Good" Physical Condition	Percentage Poorly Adjusted in "Good" Babies	Percentage Poorly Adjusted in "Poor" Babies
Total Group	226	73.9	19.2	39.0
Toxemia	29	58.6	17.7	41.7
Maternal Disease	33	78.8	26.8	42.8
Long Labor	52	63.5	21.3	42.1
Abnormal Delivery	28	46.4	7.8	53.3
Primiparous Delivery	124	62.8	24.4	37.0

are nevertheless apparent. The incidence of babies judged to be in good physical condition in the first days of life is lower than in the total series in all the groups except in the one in which the mothers had "maternal disease." This is not an unexpected finding. However, the incidence of maladjustment following a neonatal rating of good or poor is of the same order of magnitude for each of these groups as is to be found in the total series. This suggests that each one of these maternal factors, in so far as it is associated with an increased incidence of babies rated as poor, may be a component in the causation of maladjustment in childhood. It should be noted, on the other hand, that no one of

these factors of itself appears to be the definitive agent which creates later maladjustment. In a larger series of cases, they might reveal themselves to be of greater importance.

It is not possible to discuss the effect of maternal medication upon the neonatal condition of the children; there was not sufficient variety in the types of medication given. Most of the women received nitrous oxide and oxygen, with or without ether, during the second stage of labor; a great majority of them were given scopolamine and a barbiturate during the first stage of labor. In a few cases, other medications were used. It is possible to show an increased incidence of babies in poor neonatal condition following unusually large amounts of medication but such cases represent the long and difficult labors and no deduction as to the harmfulness of the medications per se is valid.

Table III presents three groups of children which were selected from the total series on the basis of specific neonatal difficulties. Again, the selected groups and their variations from the total series are too small to allow detailed conclusions. It is apparent that the percentage of neonates rated as good is much lower in each of the three groups than it is in the total series. This is to be expected since each factor was considered in the final rating of the neonatal physical condition; however, the presence of one of these factors did not necessarily insure a final rating of poor for an infant. The incidence of maladjustment following a neonatal rating of good or poor is of the same magnitude as is to be found in the total series. It may be concluded, as in the case of the maternal factors, that in so far as these neonatal difficulties are associated with an increased incidence of poor babies, they may be related to maladjustment in childhood but that no one of these difficulties is alone etiologic of such maladjustment.

TABLE III

ADJUSTMENT RATINGS OF CHILDREN WITH REFERENCE TO PHYSICAL CONDITION DURING THE FIRST TWO DAYS OF LIFE: GROUPS SELECTED WITH REGARD TO SPECIFIC NEONATAL DIFFICULTIES

Basis for Selection	Number of Cases	Percentage of Babies in "Good" Physical Condition	Percentage Poorly Adjusted in "Good" Babies	Percentage Poorly Adjusted in "Poor" Babies
Total Group	226	73.9	19.2	39.0
Resuscitated	44	34.1	13.3	44.8
Delayed Onset of Respiration	30	23.3	14.2	47.9
Unusual Cyanosis	26	19.2	20.0	42.8

Table IV presents four groups of children which were selected from the total series on the basis of factors which might be expected to affect the child's neonatal physical condition and/or to affect his later adjustment for anatomic and environmental reasons. Seven of the twins were premature infants. Groups are again small and differences approximate the same magnitude as the differences of previous tables. The importance of these factors as causative of maladjustment may be interpreted as in the previous two tables.

The slightly increased incidence of maladjustment among first children and only children, when they were evidently well-born, is not surprising. However, even in these

TABLE IV

ADJUSTMENT RATINGS OF CHILDREN WITH REFERENCE TO PHYSICAL CONDITION DURING THE FIRST TWO DAYS OF LIFE: GROUPS SELECTED WITH REGARD TO FACTORS WHICH MIGHT OPERATE ANATOMICALLY AND ENVIRONMENTALLY

Basis for Selection	Number of Cases	Percentage of Babies in "Good" Physical Condition	Percentage Poorly Adjusted in "Good" Babies	Percentage Poorly Adjusted in "Poor" Babies
Total Group	226	73.9	19.2	39.0
Twin	16	68.8	18.2	60.0
Premature	19	52.6	20.0	33.3
First Child	124	62.8	24.4	37.0
Only Child	34	50.0	29.4	35.3

two groups, poorly-born children show a higher incidence of behavior difficulties in childhood.

Among the 226 children, there were 41 families with more than one child enrolled in the study; there were 92 siblings in these 41 families. Within a given family group, there was no consistent pattern of neonatal conditions or childhood adjustments. Thus, where one child in a family was in a poor neonatal state, or showed maladjustment, his sibling or siblings did not necessarily suffer from these conditions. This suggests that family environment was not the critical factor in determining newborn status or adequacy of adjustment.

Table V presents two groups of children selected on the basis of high or low intelligence. Each child's intelligence quotient was determined as the average of at least three, and usually five to eight, tests. It must again be pointed out that the entire series represents an unselected group of children, and that the range of the intelligence quotients, if a few extremely high ones are omitted, is not great. Although the groups are small, it is evident that low intelligence is associated with a lessened incidence of good neonatal condition, as has long been recognized. It is further evident that the incidence of maladjustment following a good neonatal course is higher among the children with low intelligence quotients than it is among their more brilliant colleagues. However, because the difference between the incidence of maladjustment in the "poor" and in the "good"

TABLE V

ADJUSTMENT RATINGS OF CHILDREN WITH REFERENCE TO PHYSICAL CONDITION DURING THE FIRST TWO DAYS OF LIFE: GROUPS SELECTED WITH REGARD TO HIGH OR LOW INTELLIGENCE

Basis for Selection	Number of of Cases	Percentage of Babies in "Good" Physical Condition	Percentage Poorly Adjusted in "Good" Babies	Percentage Poorly Adjusted in "Poor" Babies
Total Group	226	73.9	19.2	39.0
I.Q. Below 95	24	62.5	26.7	88.9
I.Q. Above 110	46	74.0	11.7	33.3

babies is great in the group with low and also in the group with high intelligence quotients, it is unlikely that adjustment is entirely dependent upon intelligence. While a bright child might be better equipped to cope with physical and environmental deficiencies, nevertheless his condition in the first 48 hours of life remains important in determining his later adjustment.

Discussion

A significant relationship between the physical condition of the newborn infant and his adjustment to his environment in childhood has been demonstrated. In considering this relationship, it is imperative that associated factors be clearly distinguished from causative factors. It has not been possible to show that the individual factors, which have been studied and which are associated with an increased incidence of neonates in poor physical condition, are alone causative of maladjustment. The mother's attitude toward her pregnancy may increase the difficulties of delivery and this same attitude may condition her child adversely in later life. However, it seems profitable briefly to discuss contingencies which might result in the birth of an infant so damaged as to lead to maladjustment in childhood.

"Paranatal" factors have been mentioned in this paper. The word is used in the sense Schreiber[3] intended it: to designate factors which may be operative before, during, or just after birth. Clifford and Irving[8] have pointed out that many factors may affect the condition of the newborn: e.g. defective germ plasm, congenital defects, maternal disease and malnutrition, fetal disease, fetal anoxemia, fetal maturity, type of presentation, cephalo-pelvic disproportion, length and type of labor, method of delivery, and of course the skill and experience of the anesthetist and obstetrician.

Recent years have brought new appreciation of the ways in which some types of maternal disease[9,10] and maternal malnutrition[7] may seriously affect the condition of the newborn infant. The central nervous system of the fetus develops rapidly throughout gestation and reaches a peak of growth in the last trimester.[11] Ingalls and Gordon,[12] in discussing the dramatic fetal malformations consequent to maternal rubella, state that "minor arrests and minor degrees of mental retardation cannot be excluded without exhaustive studies and longer observation." It is probable that the developing central nervous system of the fetus may be damaged to varying degrees at any time during pregnancy. This may occur more frequently than has been recognized and the prenatal course must be guarded with such a possibility in mind. Furthermore, prenatal damage to the infant's brain may be of such type and severity as to result in an apneic newborn in poor physical status; this must not be overlooked in any discussion of the supposed effects of asphyxia neonatorum.

The most obvious opportunity for trauma to the infant is when he is passing through the birth canal; obstetricians have endeavoured constantly to minimize such trauma. The success of their efforts is obvious from the declining stillbirth rate in this country, although many infants are still damaged during the birth process. Men such as Irving[13] have been criticized by some for advocating the use of certain types of analgesia and anesthesia during labor when it is admitted that such medications delay the onset of spontaneous respirations in the newborn. However, it is well to remember that a wisely medicated mother may often find the strength to complete a difficult labor normally where, without medication, she might have required the aid of medium or high forceps with their distressing trauma to the infant.

"Proof that asphyxia leads to neurologic defects may never be found in the human newborn—."[14] Windle and others[14,15,16] have produced such central nervous system damage in animals but the experimental conditions resulted in anoxia so severe that it may not be comparable to our present problem. It seems clear that the brain of a newborn animal or infant is better able to withstand oxygen deprivation than that of a more mature organism.[17,18] Indeed, the fetal brain evidently develops in an environment which is very low in oxygen.[19,20] Although the higher centers of the adult brain, which might be expected to determine human behavior, consume more oxygen and are more quickly damaged by oxygen deprivation,[21,22] this gradient of oxygen need may not exist for the newborn.[23] Consequently, some measure of protection may be afforded from the difficulties of birth. It must be admitted that it has not been proved that asphyxia neonatorum necessarily damages the infant's brain; when such asphyxia occurs it may merely be a sign of a brain already damaged. "By no means do all asphyxiated human infants have permanent manifestations of nervous disease. However, the possibility of inferior mentality, diminished learning ability or, simply, mental dullness as sequelae of anoxia at birth should not be dismissed lightly."[14]

A maladjusted child may be the victim of a physically damaged brain. The stresses of his environment should be lessened. He should be encouraged in self-control, self-confidence, and initiative. He should be given all possible aid in his relationships with other human beings. Similarly, a child who is known to have suffered a difficult birth and neonatal period should be brought up with more than the usual regard for his possible problems with respect to personality integration and emotional adjustment.

Obviously, the paranatal factors which may be critically causative of certain childhood maladjustments have not been defined. But it is to be hoped that with a knowledge of the relationship of neonatal condition to such maladjustments, the problems of prenatal care and obstetric practice will be approached with a broader perspective for their possible effects beyond the first days of life.

Summary

In an unselected series of 226 children, 73.9% were judged to be in good physical condition during the first two days of life. Of the children in good physical condition, only 19.2% were later judged to be maladjusted; whereas, of the children in poor physical condition, 39.0% were later considered maladjusted. This is a highly significant difference and it is concluded that a child's neonatal condition may effect his adjustment in later childhood.

No single factor among the ones studied is demonstrably critical in affecting later adjustment. However, several maternal factors acting in gestation and during delivery, certain specific neonatal difficulties, and certain factors which might act anatomically or environmentally, are shown to increase the percentage of infants judged to be in poor neonatal condition.

Intelligence, as revealed by the intelligence quotient, is not the critical factor which determines adequacy of adjustment in childhood, although it is related to it.

The maladjusted child may be a victim of a physically damaged brain. He should be given all possible aid in his development and in his relations to other human beings.

A child whose history includes a difficult birth and neonatal period should be brought up with more than the usual regard for his possible emotional deficiencies and difficulties.

Many paranatal factors may affect the condition of the newborn infant. With a knowl-

edge of the relationship of neonatal condition to childhood maladjustment, it is hoped that all of these factors may be studied with a broader perspective for their possible effects beyond the first days of life.

Acknowledgement

The writer expresses his appreciation to Jane Worcester, Department of Biostatistics, Harvard School of Public Health, for her assistance in the preparation of this paper.

References

1. Little, W. J., On influence of abnormal parturition, difficult labours, premature birth, and asphyxia neonatorum, on mental and physical condition of child, especially in relation to deformities, Trans. Obstetrical Soc. London **3**:293, 1862.
2. Schreiber, F., Apnea of newborn and associated cerebral injury, J.A.M.A. **111**:1263, 1938.
3. Schreiber, F., Neurologic sequelae of paranatal asphyxia, J. Pediat. **16**:297, 1940.
4. Preston, Mary I., Late behavioral aspects found in cases of prenatal, natal, and postnatal anoxia, J. Pediat. **26**:353, 1945.
5. Gallagher, J. R., Gibbs, E. L., and Gibbs, F. A., Relation between electrical activity of cortex and personality in adolescent boys, Psychosom. Med. IV, **2**:134, 1942.
6. Stuart, H. C., and Staff: Studies from The Center for Research in Child Health and Development, School of Public Health, Harvard University; I. The Center, the Group under Observation, Sources of Information, and Studies in Progress, Monographs of Society for Research in Child Development IV: Serial 20, No. 1, 1939.
7. Burke, Bertha S., Beal, Virginia A., Kirkwood, S. B., and Stuart, H. C., Influence of nutrition during pregnancy upon condition of infant at birth, J. Nutrition **26**:569, 1943.
8. Clifford, S. H., and Irving, F. C., Analgesia, anesthesia, and newborn infant, Surg., Gynec. & Obst. **65**:23, 1937.
9. Gregg, N. M., Rubella during pregnancy of mother with its sequelae of congenital defects in child, M.J., Australia **1**:313, 1945.
10. Ingalls, T. H., Pathogenesis of mongolism, Am. J. Dis. Child. **73**:279, 1947.
11. Hesdorffer, M. B., and Scammon, R. E., Growth of human nervous system; growth of cerebral surface, Proc. Soc. Exper. Biol. & Med. **33**:415, 1935.
12. Ingalls, T. H., and Gordon, J. E., Epidemiologic implications of developmental arrests, Am. J. M. Sc. **214**:322, 1947.
13. Irving, F. C., Berman, S., and Nelson, H. B., Barbiturates and other hypnotics in labor, Surg., Gynec. & Obst. **58**:1, 1934.
14. Windle, W. F., Structural and functional alterations in brain following neonatal asphyxia, Psychosom. Med. **6**:155, 1944.
15. Heymans, C., Bouckaert, J. J., Jourdan F., Nowak, S. J. G., and Farber, S., Survival and revival of nerve centers following acute anemia, Arch. Neurol. & Psychiat. **38**:304, 1937.
16. Thorner, M. W., and Lewy, F. H., Effects of repeated anoxia on brain, J.A.M.A. **115**:1595, 1940.
17. Ford, F. F., Experimental investigation into effects of asphyxia on brain, with especial reference to asphyxia neonatorum, Bull. Johns Hopkins Hosp. **42**:70, 1928.
18. Kabat, H., Greater resistance of very young animals to arrest of brain circulation, Am. J. Physiol. **130**:588, 1940.
19. Brinkman, R., and Jonxis, J. H. P., Estimation of arterial unsaturation, especially in pediatric conditions, Acta Med. Scandinav. **94**:453, 1938.
20. Eastman, N. J., Foetal blood studies; oxygen relationships of umbilical cord blood at birth, Bull. Johns Hopkins Hosp. **47**:221, 1930.
21. MacArthur, C. G., and Jones, O. C., Some factors influencing respiration of ground nervous tissue, J. Biol. Chem. **32**:259, 1917.
22. Grenell, R. G., Central nervous system resistance; effects of temporary arrest of cerebral circulation for periods of two to ten minutes, J. Neuropath. & Exper. Neurol. **5**:131, 1946.
23. Himwich, H. E., and Fazekas, J. F., Comparative studies of metabolism of brain of infant and adult dogs, Am. J. Physiol. **132**:454, 1941.

SPANISH ABSTRACT

Realidades Paranatales que Influencian el Estado General de la Infancia

En una serie de casos generales de aproximadamente 226 niños, 73.9% fueron observados que su condición fisica durante sus primeros dos años era excelente. De los niños con excelente condición fisica, solamente 19.2% se halló que su estado general era deficiente; mientras que, niños en mediocre condición de salud, 39.0% se les consideró en un estado general de adaptación probre. Como puede verse esta diferencia indica que el ambiente del niño durante y antes del parto ejerce una influencia en su futuro.

Entre los casos en estudio ninguno indica que esta situación no pueda ser corregida. Sin embargo, hay varios elementos maternos que afectan el embarazo y durante el parto, ciertas dificultades que se encuentran en el primer hijo, y cierta influencia que puede actuar anatomicamente o emocionalmente, indica el aumento del porciento de niños en pobre condición.

Inteligencia, indicada por un examen de la abilidad mental del niño no es dato positivo del ambiente de la niñez, pero puede darnos una idea de ella.

El pobre estado general del niño puede ser atribuido a una condición fisica mental. En este caso debe darsele toda clase de tratamientos posibles para ayudarle en su desarrollo social con sus compañeros.

Un niño cuyo pasado incluye un parto dificultoso y un periodo de embarazo complicado debe ser criado en un ambiente de atención y cuidado para contrarestar posibles dificultades emocionales.

Muchos insignificantes detalles de la vida de los padres puede afectar la condición general del primer hijo. Con un completo conocimiento de la relación que existe entre el ambiente neonatal y el estado general del niño se puede experar que el estudio de estos hechos nos de una perspectiva para analizar sus efectos mas alla de los primeros días de vida del niño.

55 Shattuck St.

PARA-AMINOBENZOIC ACID IN THE TREATMENT OF ROCKY MOUNTAIN SPOTTED FEVER

A Report of Its Use in 17 Cases

By SIDNEY ROSS, M.D., PRESTON A. MCLENDON, M.D., AND HUGH J. DAVIS, M.D.
Washington, D.C.

THE use of para-aminobenzoic acid (PABA) in the treatment of rickettsial diseases has been discussed in several recent reports. The first clinical investigation, reported by Yeomans et al[1] in 1944, demonstrated that a favorable therapeutic effect could be obtained in louse-borne typhus with PABA. These authors emphasized that early initiation of treatment was of singular importance in obtaining optimal results. Tierney[2] reported that PABA exerted a beneficial effect on the course of tsutsugamuushi disease in a series of 13 treated cases. Smith[3] managed 29 cases of murine typhus with PABA and concluded that patients receiving PABA progressed more favorably and followed a more benign course than those untreated.

Rose et al[4] reported the first instance of the use of PABA in Rocky Mountain spotted fever. They treated one case with apparently beneficial results. Since then several other reports[5–9] have appeared which indicate that PABA decreases both the morbidity and mortality rates of Rocky Mountain spotted fever in children and adults.

In a previous paper[10] we reported the use of PABA in eight cases of spotted fever during the summer of 1946 at Children's Hospital, Washington, D.C. It was demonstrated that PABA exerted a beneficial effect on the course of the disease. The present report gives the results in the treatment of nine additional cases of Rocky Mountain spotted fever in the summer of 1947. In view of the relatively small number in the total group it was not possible to run a control series of untreated cases. However, the PABA treated patients may be compared to previous experiences with Rocky Mountain spotted fever at Children's Hospital prior to the advent of PABA which were reported in 1940 by Ong and Raffeto.[11]

MANAGEMENT OF CASES

a. *Laboratory:* A standard procedure was adopted for all cases under treatment during 1947 and consisted of the following:

1. Daily white and differential blood cell counts.
2. Daily PABA levels (obtained one hour before the next dose).
3. Urinalysis every second day.
4. Blood NPN every second day.
5. Cephalin flocculation test, prothrombin time, CO_2 combining power and total blood protein determinations before PABA therapy was started and every third day thereafter.
6. Weil-Felix and complement fixation tests as indicated for diagnosis (usually positive between 10-14 days after onset of the disease).
7. Total fluid intake-output charts on all patients.

From the Children's Hospital, Washington, D.C., and the George Washington University Medical School.

(Received for publication May 28, 1948.)

TABLE I

DATA SUMMARY OF 17 PATIENTS WITH ROCKY MOUNTAIN SPOTTED FEVER TREATED WITH PARA-AMINOBENZOIC ACID

Case	Age (Years)	Weight (kg.)	Day of Disease Paba Started	Days of Fever After Paba Started	Duration of Paba Rx (Days)	Maximum Paba Level (mg./100 cc. blood)	Total Paba (gm.)	Lowest WBC (Thousand)	Highest Ceph. Flocculation	Lowest Prothrombin %	Lowest Total Protein (gm./100 cc. blood)	Severity of Case	Outcome	Paba (gm./kg./24°)
M.Z.	7½	25.4	4	4	4	67	104	6.0	4+	95	5.9	2+	Recovery	1.0
M.L.	9	30.0	4	4	4	80	114	4.4	4+	61	4.62	3+	Recovery	1.0
L.H.	3	14.5	4	4	4	3	62	4.2	4+	87	6.69	3+	Recovery	1.0
M.B.	2½	10.9	4	3	6	13.3	64	4.9	4+	80	6.6	1+	Recovery	1.0
R.R.	7	18.1	3	2	3	66.6	32	3.7	2+	100	4.9	2+	Recovery	1.2
E.H.	8	18.1	4	2	4	53	58	5.1	2+	95	6.56	1+	Recovery	1.0
F.W.	5	13.6	7	3	6	25	59	3.4	3+	80	4.83	3+	Recovery	.6–.8
M.J.P.	5	12.7	7	4	6	44	84	3.5	3+	62	4.12	3+	Recovery	.6–.8
B.P.	7	21.3	11	16	5	100	110	7.1	4+	87	4.21	4+	Recovery	.5–1.4
D.B.	4	16.8	9	6	10	24	108	3.6	4+	50	.	2+	Recovery	.6
S.H.	7	20.5	9	5	10	37	202	6.1			5.8	2+	Recovery	1.0
D.V.	1½	8.6	2	2	8	40	74	5.7	3+	70	6.5	1+	Recovery	1.2
S.W.	8	22.7	10	12	9	35	186	9.5	4+		5.7	3+	Recovery	1.0
J.M.	4	14.0	8	22	4	80	36	8.5	4+		4.7	4+	Recovery	.5
C.C.	11	37.0	8	11	9	40	104	4.7	4+		3.9	4+	Recovery	.4–.6
C.L.	26	68.0	10	4	6	27	162	7.1			7.1	3+	Recovery	.4
R.L.	26	68.0	6	3	7	29	132	6.1			7.2	2+	Recovery	.4

This daily evaluation of the patient is considered a requisite for optimal management.

b. *Specific Therapy:* In all cases, powdered PABA was dissolved in 5% sodium bicarbonate solution so that 15 cc. of the mixture contained 1 gm. of PABA. This preliminary neutralization was designed to lessen gastric irritation. The mixture was chilled and given in fruit juice. During the first one or two days an occasional child was disinclined to take the medication orally. However, after toxicity subsided (usually within 24 to 48 hours), the patients took the drug readily and little vomiting was encountered. Yeomans et al[1] report one instance of tracheitis produced by aspiration of PABA. In the infrequent instance where a child is comatose, uncooperative or vomiting unduly, the drug may be gavaged or given parenterally. A 25% solution of the sodium salt in a solution of sodium chloride is available for intravenous or intramuscular use. The oral route of administration is to be preferred. The dosage in this series ranged between 0.6 to 1.0 gm./kg. body weight of PABA in 24 hours using a two-hour divided dosage schedule. Thus a 22.5 kg. child received 15 to 25 gm. of the drug daily or 1.3 to 2 gm. every two hours throughout the day and night.

c. *Supportive Therapy:* The majority of patients in this series received supportive intravenous infusions including blood, plasma, crystalloids and protein hydrolysates intravenously to combat peripheral shock, dehydration and hypoproteinemia. In this regard, we are in complete agreement with Harrell et al[12] that no deleterious effects followed intravenous alimentation in spotted fever as was formerly believed. A high carbohydrate, high protein diet with adequate vitamin supplements was routinely employed. Penicillin was used in three cases where a complicating bronchopneumonia appeared. Sulfonamides are definitely contraindicated in view of the demonstrated antagonism between sulfonamides and PABA as well as the untoward effect following the use of sulfonamides per se in rickettsial infections. One patient who had myocarditis and congestive failure as an attendant complication was digitalized.

Results

In 17 cases of Rocky Mountain spotted fever treated with PABA during the summers of 1946 and 1947, there were no deaths (Table I). This is to be compared with the 30 patients with spotted fever who did not receive PABA between 1931 to 1945 at Children's Hospital; of this number there were three deaths (10%). This difference in mortality rate in the two groups is not statistically significant. However, a compilation of the results of treatment of spotted fever with PABA reported thus far, in addition to our own cases, lends itself more readily to statistical analysis regarding the efficacy of the drug (Table II). A total of 51 patients including 43 children and 8 adults have been reported to date. Of this number, 48 (94.1%) recovered. Woodward[8] reported a death in a two-year-old child who was started on PABA on the 19th day. A second death was reported by Peterson et al[13] in a child with fulminating spotted fever who received PABA starting on the fifth day; the child died shortly after entry into the hospital. The third fatality discussed by Flinn et al[6] was that of a 67-year-old man whose treatment was started on the eighth day. The NPN rose to 60 mg./100 cc. blood and the patient died in uremia. At autopsy, he was found to have long-standing renal disease antedating the spotted fever. This over-all mortality rate of 5.9% is in contrast to the 25% mortality rate which has prevailed in the eastern type of spotted fever prior to the use of PABA.

There was a noticeable difference in the course of the disease in the treated and

untreated cases of this series. A comparison of the temperature curves in both groups is shown in Chart I. The points on the curves indicate the averages of the *highest* daily temperature for all cases in each group. As will be noted, there was a more rapid defervescence of temperature in the cases treated with PABA when compared with untreated patients. It should be pointed out that the response to PABA was more gradual than precipitous, and was not comparable to the dramatic response of susceptible infections to sulfonamides and antibiotic drugs. The secondary rise in average temperatures of the treated group from the fifth to the eighth day, noted in Chart I, is a reflection of the high febrile courses of Cases 5 and 6 who developed a complicating pneumonitis and parotitis, and Case 16 with associated myocarditis and pneumonitis. In the remaining 14 uncomplicated cases, the temperature came down to normal on an average of 5½ days after the initiation of PABA therapy.

Similarly, it was our impression that the morbidity, and degree of toxicity was decreased

TABLE II

COMPILATION OF THE RESULTS OF TREATMENT OF SPOTTED FEVER WITH PABA REPORTED THUS FAR

Author	Number of Patients	Number of Recoveries	% Recoveries
Rose et al.[4]	1	1	100
Flinn et al.[6]	10	9	90
Ravenel[7]	5	5	100
Maroney et al.[5]	1	1	100
Woodward[8]	13	12	92.3
Hendricks et al.[9]	1	1	100
Peterson et al.[13]	3	2	66.6
Children's Hospital, Washington, D. C.	17	17	100
	51	48	94.1%

in the cases treated with PABA. Usually by the second or third day after initiation of the drug, the patients were no longer lethargic or hyper-irritable and the characteristic toxic appearance showed definite evidence of subsiding. The rash usually disappeared by the fifth to the eighth day in the patients receiving PABA.

The drug was administered for an average of six days and was usually discontinued within two to four days after the temperature returned to normal.

CORRELATION BETWEEN TIME OF INITIATION OF PABA AND RESPONSE TO THERAPY

Of the ten cases treated with PABA on or *before* the seventh day of the disease, none showed fever beyond four days after initiation of therapy; the average for this group was three days. Of the remaining seven cases started on PABA therapy *after* the seventh day, the average duration of fever following initiation of PABA was ten days. Of the three patients who ran a severe course and developed complicating pneumonitis, two (Cases 5 and 6) were started on the eighth day while the third (Case 16) received the first dose of PABA on the 16th day.

There appears to be little doubt both from the reports of others,[1,2,14] as well as

CHART I

A Comparison of the Temperature Curves in the Treated and Untreated Series of Cases of Spotted Fever. The Points on the Curves Indicate the Averages of the Highest Daily Temperature for All Cases in Each Group

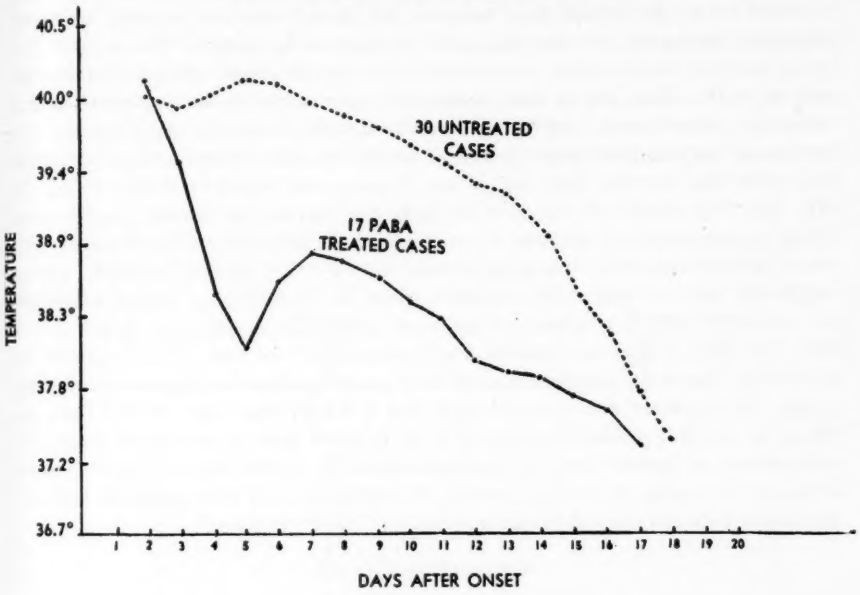
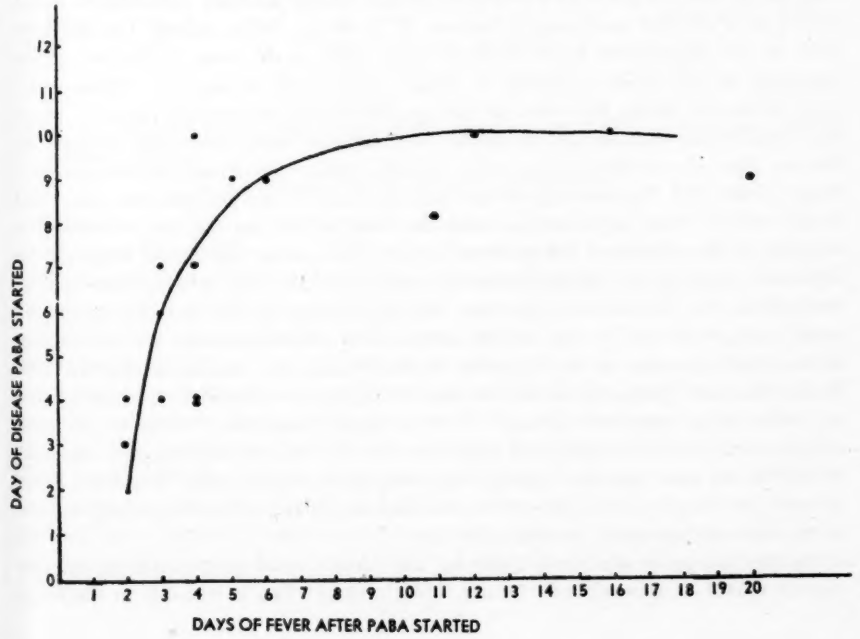


CHART II

Correlation Between the Time of Initiation of Paba Therapy and the Duration of Fever.



our own observations that the earlier the initiation of PABA therapy, the better the response (Chart II). Favorable therapeutic results can probably be expected if the drug is started before the seventh day; however, the optimal time for initiating treatment probably is during the first four days after the onset of the diseases. This is predicated by the fact that rickettsia reside and multiply intracellularly largely within the endothelial cells of small vessels. PABA must theoretically gain access to the organisms located within the cells where it inhibits the intracellular multiplication of the rickettsia. Unfortunately, early hospitalization in cases of Rocky Mountain spotted fever is the exception rather than the rule. Only five of our 17 cases were started on PABA before the fifth day. This emphasizes the need for early detection of the disease, possibly even before the appearance of the rash. A recapitulation of the early pre-eruptive symptoms would include high fever, (ranging between 38.9-40° C.) malaise, headache, aching extremities, anorexia and chilly sensations which in themselves are rather nonspecific and would be unlikely to allow a diagnosis of spotted fever without a history of tick bite. The latter is often not elicited. The appearance of the rash which is usually on the third or fourth day after the onset of fever usually permits the diagnosis to be made readily. From present data it would seem that if PABA was begun at this time, the efficacy of the drug would be enhanced. In areas where there is an unusual geographic concentration of spotted fever the physician should be on the alert for the occurrence of the disease during the summer months. All patients in such areas should be routinely questioned for history of tick bite in instances of cryptogenic fever.

Schedule of Dosage

The optimal dose of PABA in spotted fever requires further clarification both in children and adults. In a previous communication,[10] we reported that 0.65 to 1.0 gm./kg. body weight per 24 hours in a two-hour divided dosage schedule for children would usually yield a PABA level ranging between 15 to 40 mg./100 cc. blood. This has been more or less substantiated by the findings in our more recent cases. In the two groups consisting of 15 children ranging in weight from 9 to 36 kg., 71 PABA assays were performed during the course of therapy (an average of five per patient). There was considerable variation in the blood level achieved with comparable dosage; no definite linear or curvilinear correlation between dosage and blood concentration was noted (Table III). For example in two cases (11 and 12) the average level was 3 and 8 mg./100 cc. blood respectively in spite of a dose of 1.0 gm./kg. in 24 hours. The variation in the anticipated PABA blood levels with a given dose of the drug may be explained either by the differential rate of excretion of the drug or a different rate of metabolism. It is pertinent to point out that the drug is excreted very rapidly in the urine; and, at the end of two to three hours, only minimal amounts are still present in the blood. In view of the variability of fluid intake and output in children with Rocky Mountain spotted fever, the considerable variation in blood levels from patient to patient with comparable dosage is not altogether surprising. Flinn et al[6] have suggested that by limiting the fluid intake one can decrease the rapid urinary excretion of PABA and thus maintain higher blood levels with smaller doses. We would favor a therapeutic increase in the dose rather than limit the intake of fluids especially in view of the relatively non-toxic character of PABA.

On the average, a dose of 0.8 gm./kg./day in our series of 15 cases in children yielded a level of approximately 30 mg./100 cc. blood. This is probably in the range

of an adequate blood concentration. There is insufficient clinical evidence as yet to indicate that levels higher than 30 to 40 mg./100 cc. blood offer any singular advantage in spotted fever.

It is to be noted that 24 to 48 hours was often required to attain adequate concentrations after the initiation of PABA therapy.

In this series, PABA blood levels were obtained daily about one hour after the previously administered dose. Experimentally, it would be desirable to obtain PABA levels at frequent intervals during the day with due regard for intake and output of

TABLE III

AVERAGE BLOOD LEVEL OF PABA CORRELATED WITH THE DOSAGE IN 15 CASES IN CHILDREN. NOTE THE VARIATION IN THE BLOOD LEVELS OBTAINED WITH COMPARABLE DOSAGE

Case No.	Weight of Patient kg.	Dose/kg./24 hr. Gms.	Average Paba Blood Level (Mg./100 cc.)
1	16.8	.6	20
2	20.5	1.0	29
3	8.6	1.2	33
4	22.7	1.0	19
5	14.0	.5	53
6	37.0	.5	20
9	22.7	1.0	49
10	30.0	1.0	36
11	14.5	1.0	3
12	10.9	1.0	8
13	18.1	1.2	66
14	18.1	1.0	32
15	13.6	.7	10
16	12.7	.7	22
17	21.3	.8	62

fluids and the renal status. One PABA blood assay per day, however, ordinarily suffices for clinical purposes.

CLINICAL MANIFESTATIONS OF TOXICITY

There have been few reports of untoward clinical effects in the use of PABA. Woodward[8] found that an occasional child became delirious and irrational when the PABA level exceeded 60 mg./100 cc. blood; these symptoms promptly disappeared when the blood level was lowered. Two patients of this series (Cases 5 and 6) became delirious and comatose at a time when the PABA levels ranged between 40 to 80 mg./100 cc. blood. However, both of these children were severely ill with a complicating parotitis and bronchopneumonia. It was difficult to determine whether the disorientation and lethargy noted in these two patients was due to the disease per se or to the toxic effects of the drug. In an attempt to dissociate the effects of the drug from the disease, a series of six control children, selected at random, were given therapeutic doses of PABA for four consecutive days. In spite of the high drug levels (up to 54 mg./100 cc. blood) attained, no evidence of drowsiness or lethargy was observed, suggesting that the apathy and disorientation in our Cases 5 and 6 may have been due to the disease rather than to the drug.

Effects of PABA on Blood Chemistry

In ten patients in this series, a total of 26 blood NPN determinations were done. Of these, 19 or 73% were below 35 mg./100 cc. while in seven instances (27%), the NPN was above 35 mg./100 cc. Six of these latter seven determinations ranged from 40 to 53 mg./100 cc. In the seventh instance, the NPN rose to 90 mg./100 cc. while concomitantly the PABA blood level was 40 mg./100 cc. PABA was promptly discontinued and the NPN dropped to 26 mg./100 cc. 48 hours later. In all cases, a good urinary output was maintained with no especial attempt being made to alkalinize the urine. An elevated NPN does not necessarily constitute a contraindication to the use of PABA or its continuation, unless the nitrogen retention goes inordinately high. The slightly elevated NPN noted in about one-fourth of the cases in this series is probably attributable to a lowered blood volume resulting from extravasation of fluids and plasma proteins into tissue spaces through damaged blood vessels. This results in a lowered blood pressure and glomerular filtration pressure with a resulting pre-renal azotemia. It is of importance, therefore, to perform periodic NPN determinations to ascertain the extent of renal function so that a rapid rise in PABA levels in the blood may be anticipated. There is no evidence at this time that PABA produces kidney complications in spite of its chemical similarity to the sulfonamide drugs. Of 79 urines examined in this series, there was no evidence of hematuria or crystalluria, though many of the urines had an acid reaction.

Pathologically, it has been found that the liver shares similar generalized capillary damage noted in most other organs in Rocky Mountain spotted fever. There is both edema throughout the lobule and a localization of capillaritis in the periphery of the lobule. One would expect, therefore, some clinical pathologic indices to reflect this liver dysfunction and such was found to be the case. Thirty-four cephalin flocculation tests were performed in 14 patients in this PABA treated series. Of this number, 24 determinations ranged between 3+ to 4+ (71%) while 6 (18%) of the cephalin flocculations were 2+ and 3 (9%) were 1+. Only one cephalin flocculation test out of 34 was negative and in this instance, it was on the second day of illness. Otherwise there was no positive correlation between the day of the disease and the extent of positivity of the cephalin flocculation test. In some of the patients the cephalin flocculation was still 3+ to 4+ for 20 to 30 days after the onset of the disease. Follow-up tests beyond four weeks to determine the duration of this index of liver dysfunction were not done. Clinically the liver was only infrequently enlarged and there was no evidence of jaundice in any case.

In a previous report[10] we discussed the ability of PABA per se to produce an increase in cephalin flocculation positivity. A series of six normal controls ranging in age from 3 to 11 years were given 0.65 gm./kg. body weight of PABA in 24 hours for four consecutive days and daily cephalin flocculation tests were obtained. In all four cases, the titer rose to 3+ to 4+ within 24 to 48 hours after the initiation of PABA. Thus there is some question as to whether the marked cephalin positivity noted in the spotted fever cases represents an effect produced by the disease or the drug or both. It is worthy of note that three out of seven cephalin flocculation tests obtained prior to initiation of PABA in the treated cases of Rocky Mountain spotted fever ranged from 3+ to 4+ indicating a production of liver dysfunction by the disease itself. In the majority of instances the cephalin flocculation test remained positive for a considerable period after PABA was discontinued.

One can probably conclude that both Rocky Mountain spotted fever and PABA are capable of producing an increase in cephalin flocculation positivity. The pathologic effect on the liver by the disease could adequately explain this phenomenon in the cases of Rocky Mountain spotted fever; however, the apparent propensity for increase in cephalin positivity by PABA is not so clear nor can its clinical significance be interpreted at the present time. In three PABA treated cases who died of typhus fever, Snyder et al[14] reported that no lesions were seen in the liver which could be ascribed to poisoning by PABA.

The Presence of a Reducing Substance in the Urine During PABA Therapy

In the present series, it was noted that frequently while on PABA therapy a reducing substance was found in the urine producing a green or yellow reduction with Benedict's copper reagent.* Initially this was regarded as an adventitious finding; however, its frequency in our first few cases prompted a more careful determination of the etiologic factor involved and in the later cases in the series, urines were obtained regularly before, during, and after termination of PABA therapy.

In 13 of our cases, a total of 79 urinalyses were performed. Of these, nine urines in different patients were examined prior to PABA administration and none showed any evidence of a reducing substance. Forty-three urinalyses performed during PABA therapy, however, showed a reducing substance in 24 instances (55%); there was no associated diacetic acid or acetone and there had been no concurrent administration of intravenous glucose in any of the patients. A total of 27 urinalyses were done following termination of therapy; four of these showed a reducing substance only during the first 24 hours after PABA had been discontinued. All subsequent urines were entirely negative. The presence of this reducing substance in the urine was not correlated with the PABA blood level nor with the duration of therapy. It usually appeared within 12 to 24 hours after initiation of PABA therapy and disappeared within a similar interval after the drug was discontinued. In the majority of instances, the reduction was only 1+; however, an occasional 2+ to 3+ reduction was noted. In one patient, six out of eight urines examined while on PABA therapy showed this reducing reaction. Only two patients out of 13 whose urines were examined repeatedly during therapy showed no reducing substance.

---

* It has long been known that certain aromatic acids such as benzoic and phenylacetic acid may be conjugated with glucuronic acid in the animal organism. Hanson et al[15] reported that the average daily excretion of glucuronic acid by normal rabbits was 140 to 150 mg. Dziewiatkowski and Lewis[16] have postulated that when a significantly increased content of glucuronic acid is observed in urines after the administration of compounds which are known to conjugate with it, these values represent increases in true glucuronic acid and the calculated extra glucuronic acid gives an accurate measure of the amount of foreign compound thus conjugated. Urines containing extra glucuronic acid all reduced Benedict's reagent for sugars.

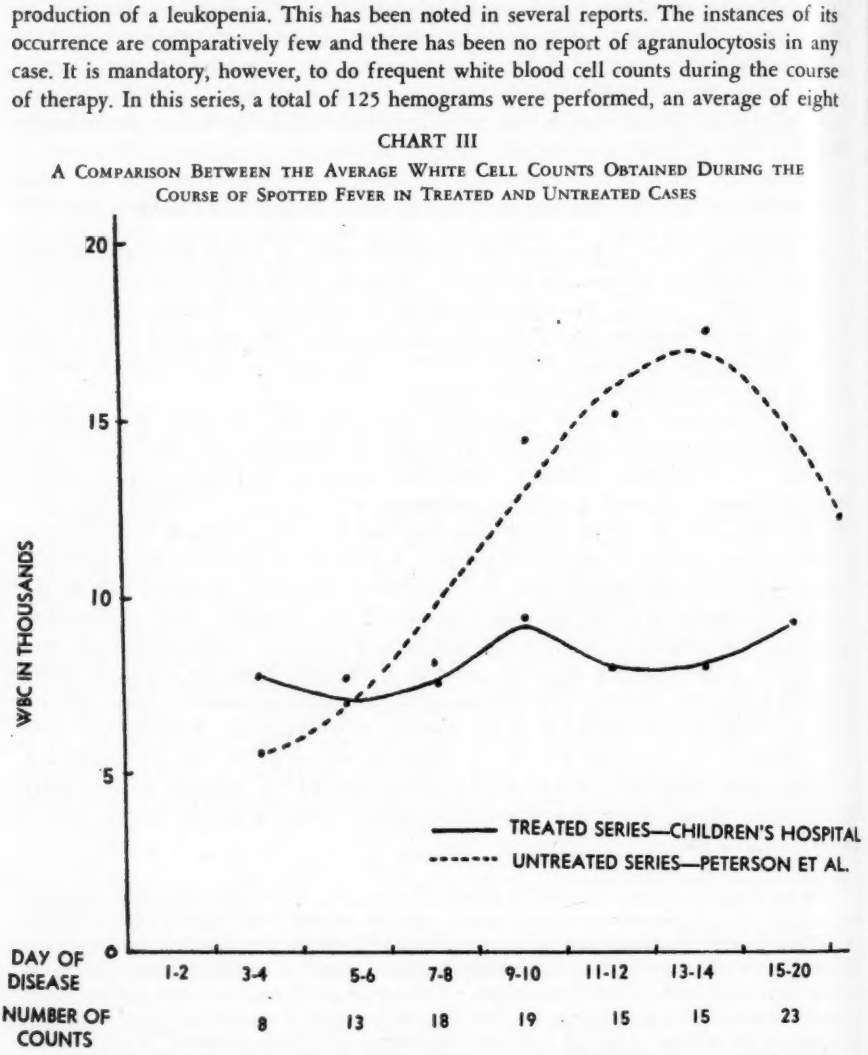
The ease with which the urines reduced Benedict's reagent without previous hydrolysis suggested that we were concerned with a labile glucuronide such as a benzoylglucuronide resulting from the conjugation of PABA with glucuronic acid. It is planned to test for glucuronic acid in future cases with the Jaffe test (picric acid and sodium hydroxide) and the Tollens test (napthoresorcinol). More recently a test for the presence of glucuronic acid has been described by Dische[17] in which concentrated sulfuric acid is mixed with the test solution followed by the addition of carbazole; this results in the appearance of a pink color within a few minutes and is considered to be more specific reaction than either the Tollens or Jaffe test.

Effect of PABA on the White Blood Cell Count

One of the few untoward effects noted with PABA administration has been the production of a leukopenia. This has been noted in several reports. The instances of its occurrence are comparatively few and there has been no report of agranulocytosis in any case. It is mandatory, however, to do frequent white blood cell counts during the course of therapy. In this series, a total of 125 hemograms were performed, an average of eight

CHART III

A Comparison Between the Average White Cell Counts Obtained During the Course of Spotted Fever in Treated and Untreated Cases



per patient. In eight of the 17 cases treated with PABA, the count dropped below 5 thousand during the course of therapy; there was no associated granulocytopenia. The decrease in the WBC was for the most part gradual and usually occurred between the fourth and sixth day. Following termination of the drug, the WBC rose promptly to its normal level within 24 to 72 hours. We do not believe that premature discontinuation of PABA therapy is indicated unless the WBC goes below 3 thousand.

That the overall WBC is decreased during the course of PABA therapy in the majority of instances, even though a definite leukopenia does not always appear, is suggested

statistically by a comparison of hemograms in PABA treated cases in this series with those obtained in the series reported by Peterson et al[13] where PABA was not used (Chart III). In an untreated group of 26 cases, Peterson and his associates performed 70 white and differential cell counts, and found a relative leukopenia during the first five days varying from 4 to 10 thousand. During the second week there was a definite leukocytosis ranging from 13.7 to 17.8 thousand. In our series of 17 cases, a total of 125 white and differential cell counts was performed. We similarly noted a relative leukopenia during the first five days averaging 6.7 to 7.5 thousand. During the second week where one would ordinarily expect a definite leukocytosis in untreated cases, we found the WBC usually ranging between 7.2 and 9.2 thousand. Thus on the average, a relative leukopenia was noted throughout the entire course of the disease in PABA treated cases. A leukocytosis above 12 to 15 thousand was noted in only three of the 17 cases in our series, and in all three instances the patients were acutely ill with associated bronchopneumonia and/or myocarditis. This leukocytosis may be of some value in PABA treated patients of Rocky Mountain spotted fever as an index of a complicating infection.

Conclusions

PABA was used in 17 cases of Rocky Mountain spotted fever during the summers of 1946 and 1947 with recovery of all patients. Both the morbidity and degree of toxicity were decreased. The earlier the initiation of PABA therapy, the better the response. Favorable therapeutic results can probably be expected if the drug is started before the seventh day. The optimal time for initiating treatment probably is during the first four days after the onset of the disease. The importance of early diagnosis is emphasized.

There is considerable variation in the PABA blood level achieved with comparable dosage, there being no definite linear or curvilinear correlation between dosage and blood concentration. On the average, a dose of 0.9 gm./kg. body weight in 24 hours in a two-hour divided dosage schedule was found to be satisfactory in children.

PABA has few toxic manifestations. A leukopenia without granulocytopenia was found to occur in some cases. Cephalin flocculation tests showed an increase in positivity during PABA therapy. A reducing substance which produced a green or yellow reduction with Benedict's reagent was found in 55% of the urines examined during PABA therapy. This reducing substance is probably a benzoylglucuronide resulting from the conjugation of PABA with glucuronic acid.

Acknowledgement

We wish to express our appreciation to Dr. E. Clarence Rice for his assistance with the laboratory procedures for this study.

References

1. Yeomans, A., Snyder, J. C., Murray, E. S., Zarafonetis, C. S. D., and Ecke, R. S., Therapeutic effects of para-amino benzoic acid in louse-borne typhus fever, J.A.M.A. **126**:349, 1944.
2. Tierney, N. A., Effect of para-amino benzoic acid in tsutsugamushi disease, J.A.M.A. **131**:280, 1946.
3. Smith, P. K., Use of para-amino benzoic acid in endemic (murine) typhus, J.A.M.A. **113**:1114, 1946.
4. Rose, H. M., Duane, R. B., and Fischel, E. E., Treatment of spotted fever with para-amino benzoic acid, J.A.M.A. **129**:1160, 1945.
5. Maroney, J. W., Davis, H. C., and Scott, E. G., Rocky Mountain spotted fever; case treated with para-amino benzoic acid, Delaware State M. J. **18**:104, 1946.

6. Flinn, L. B., Howard, J. W., Todd, C. W., and Scott, E. G., Para-amino benzoic acid treatment of Rocky Mountain spotted fever, J.A.M.A. **132**:911, 1946.
7. Ravenel, S. F., Para-amino benzoic acid therapy of Rocky Mountain spotted fever, J.A.M.A. **133**:989, 1947.
8. Woodward, T. E., cited by Greeley, D. M., Treatment and Prevention of Rocky Mountain Spotted Fever in Children, Med. Clinics North America, W. B. Saunders & Co., Philadelphia, 1947, p. 647.
9. Hendricks, W. J., and Peters, M., cited by Greeley, D. M., Spotted fever treated with Para-Aminobenzoic Acid, Ibid.
10. Tichenor, C. J., Ross, S., and McLendon, P. A., Rocky Mountain spotted fever; preliminary report on use of para-aminobenzoic acid, J. Pediat. **31**:1, 1947.
11. Ong, N. A., and Raffetto, J. F., Rocky Mountain spotted fever; analysis of 18 cases in children, J. Pediat. **17**:647, 1940.
12. Harrell, G. T., Venning, W. L., and Wolff, W. A., Treatment of Rocky Mountain spotted fever with particular reference to intravenous fluids; new approach to basic supportive therapy, J.A.M.A. **126**:929, 1944.
13. Peterson, J. C., Overal, J. C., and Shapiro, J. L., Rickettsial diseases of childhood, J. Pediat. **30**:495, 1947.
14. Snyder, J. C., Yeomans, A., Clement, D. H., Murray, E. S., Zarafonetis, C. J. D., and Tierney, N. A., Further observations on treatment of typhus fever with para-amino benzoic acid, Ann. Internal Medicine **27**:1, 1947.
15. Hanson, S. W. F., Mills, G. T., and Williams, R. T., Study of determination of glucuronic acid by naphthoresorcinol reaction, with photoelectric absorptiometer, Biochem J., **38**:274, 1944.
16. Dziewiatkowski, D. D., and Lewis, H. B., Metabolism of trimethylacetic acid and tertiary butylacetic acid; new examples of conjugation with glucuronic acid. J. Biol. Chem. **158**:77, 1945.
17. Dische, Z., New specific color reaction of hexuronic acids, J. Biol. Chem. **167**:189, 1947.

SPANISH ABSTRACT

El Ácido Para-Aminobenzoico en el Tratamiento de Tabardillo Pintado en las Montañas Rocosas

En una serie de 17 casos de tabardillo pintado de las Montañas Rocosas, tratados en el Children's Hospital, Washington, D.C., durante 1946 y 1947, se les administró Acido Para-Aminobenzoico. Nu hubo muertes en estos casos y se consideró que la morbilidad, toxicidad, y la duración de esta enfermedad era considerablemente menor que en previos años cuando PABA no era usado. Una recopilación de casos tratados con PABA en folletos medicos revela que hasta el presente han ocurrido solamente tres muertes en 51 casos, or sea 5.9% de defunciones.

Es necesario poner de relieve que con el pronto uso de PABA los resultados seran mejores. Si la droga pudiese ser administrada a los dos o cuatro dias del principio de la enfermedad cabría esperar una mas rapida recuperación. Es dificil definir los limites dentro de los cuales se pueden esperar efectos curativos de la droga; sin embargo se notaron menores efectos terapeuticos favorables cuando empezó a administrarse la droga después del séptimo día.

PABA se excreta rapidamente por la orina, de forma que al cabo de dos horas poca o ninguna cantidad de la droga puede encontrarse en la sangre. Se recomienden relativamente grandes dosis en los ninos (0.6 a 1.0 gm. por kilo de peso corporal cada 24 horas) administrandola en dosis parciales cada dos horas. Debe intentarse mantener un nivel en sangre entre 25 to 40 mg. por 100 cc. de sangre. Se investigará diariamente el nivel de PABA y el recuento de leucocitos durante la terapeutica. Si las celulas blancas bajan a 3000, se considera aconsejable administrar la droga discontinuadamente. PABA tiene la tendencia de producir un aumento transitorio de la floculación positiva de cefalinas durante la terapeutica; el significado de este hallazgo no es conocido en el tiempo presente.

Durante la administración de PABA se notó frecuentemente una substancia que reduce en la orina. Esto se creyó debido al resultado de la conjugación bensoil-glucoromica de PABA con el acido glucoromico.

3118 Sixteenth St., N.W.

THE TREATMENT OF TETANUS

Report of Two Cases with Critical Comment on New Therapeutic Resources

By RUTH C. HARRIS, M.D., THOMAS F. MCDERMOTT, M.D., AND FERNAND L. MONTREUIL, M.D.
New York, N.Y.

TETANUS has been known as a specific disease for over 2300 years. During the past 57 years antitoxin has been available to help counteract the exotoxin; recently many new sedatives have been employed to depress the threshold of nervous response. These measures have succeeded in lowering mortality rates only to 30%; hence the therapeutic problem still presents a challenge.

Although antitoxin is not so efficient in this disease as it is in diphtheria, the knowledge that recovery leaves no residual damage gives one hope that the patient can be saved by symptomatic measures used for control of symptoms if he can be kept alive during the acute, fulminating period of the disease. To this end, there are many new agents available to aid in maintaining nutrition by parenteral routes, to increase the efficiency of sedation without proportionate increase in toxic effects, and to counteract the peripheral action of excess nerve irritability. By the combined use of continuous sedation, curarization, parenteral nutrition, prophylactic chemotherapy and tracheotomy with frequent suction of the tracheo-bronchial tree, one patient survived in the face of an apparently fatal infection. To achieve this the combined efforts of members of the departments of neurology, anesthesiology, surgery, otolaryngology, and pediatrics were utilized and a team comprised of members of the house staff maintained a 24-hour vigil for a 2½ week period. Report of two such cases is presented.

CASE REPORTS

Case 1: M.C., a six-year-old white girl, was admitted to the hospital six days after she had fallen in her yard and sustained a cut below the right knee. Within a few hours of the injury a physician cleaned the wound and inserted one suture. Tetanus antitoxin was not given. The child was well until the day of admission, when she awoke complaining of stiffness in her shoulders and face. During the day she complained of pain on moving her jaws and "talked through her teeth." She had orange juice for breakfast but refused all food and fluid the rest of the day. In the hospital admitting room she was noted to have stiffness of the neck and jaw and talked with her jaws clenched, although she could open and close her mouth on command. Thirty minutes after arrival she had a generalized tonic convulsion with clenched jaws, flexed arms, heavy labored breathing and cyanosis. This lasted about three minutes, during which she was completely conscious. Phenobarbital sodium, 0.1 gm., was given intramuscularly and she was admitted to the hospital.

Her temperature was 40.3°C., pulse 132, respirations 36 and blood pressure 96/62 mmHg. Her weight was 26.5 kg. Several scars from old scratches were noted on both legs, and below the right knee there was a 1 cm. crusted lesion which felt slightly fluctuant and was thought to contain pus. All extremities felt stiff and resistant; her neck could be flexed, but marked resistance was noted.

The teeth could be separated 1 to 2 cm.; the pharynx was moderately injected and the tonsils almost met in the mid-line. A few small non-tender anterior and posterior cervical lymph nodes

---

From the Departments of Pediatrics, Anesthesiology and Otolaryngology, Columbia University College of Physicians and Surgeons, and the Babies Hospital, New York City.

(Received for publication May 9, 1948.)

were present, as well as one in each axilla and several small, non-tender nodes in the groins. Chest expansion seemed equal but limited in its movement. The abdomen was tense but relaxed between crying spells. The rest of the physical findings were normal.

Laboratory findings on admission included Hgb. 10 gm.; RBC 3.6 million/cmm.; normal platelets. WBC was 10.4 thousand/cmm. with polynuclear leukocytes 77%. Urine sp. gr. was 1.011; one-plus albumin was present; there was no sugar or acetone and the microscopic examination was normal.

On admission, an initial intramuscular dose of 21,500 units of tetanus antitoxin was given after skin testing and was followed by 20,000 units intravenously in 50 cc. of isotonic salt solution, given over 50 minutes. Curare was begun one-half hour after her initial convulsion by the intramuscular injection of 1 cc. crystalline d-tubocurarine chloride (Squibb) in wax and oil* (30 mg. or 175 units = 1 cc.), and one-half hour later by 1 cc. aqueous curare (Intocostrin,† Squibb, 20 units = 1 cc.) given intramuscularly. Three hours after admission, under sodium pentothal anesthesia the wound was excised and the site treated locally with zinc peroxide and penicillin. Following the operation sedation was maintained by intravenous 2.5% sodium pentothal. Prophylactic sulfadiazine and penicillin were instituted. During the first 24 hours she became progressively worse, with frequent episodes of trismus and generalized spasms. Respirations were stertorous and obstructed. About 16 hours after admission a metal airway was inserted over the tongue to help relieve the obstruction to breathing. This was only partially effective and it was necessary to spray the pharynx with 2% butyn sulfate solution to minimize the irritation. Oxygen was administered by tent. The patient's position was changed every two hours and all necessary procedures were performed on this schedule so as to concentrate all stimuli in as brief a period as possible and thus to permit long intervals for rest and recuperation, and to minimize the need for sedation.

On the second day in the hospital respirations continued to be labored and obstructed; evidence of atelectasis of the right lung appeared. Tracheotomy was performed. Thick, gelatinous secretions were removed from the trachea; following this breath sounds were greatly improved. Thereafter tracheal suction was employed at intervals of from 30 minutes to two hours. This measure usually required the use of 1 to 5 cc. pentothal sodium a few minutes before each suctioning to minimize convulsive movements.

The patient required constant supervision and observation. For the first four days catheterization was necessary every 12 hours. Thereafter she voided spontaneously. On the fifth day edema of the face was noted; this was interpreted to be a result of positional stasis since the foot of the bed had been elevated to improve tracheal drainage. The edema lasted for approximately five days.

Convulsive episodes were frequent and required constant sedation. By the twelfth day, spasms were fewer and she responded to commands by opening her eyes and smiling. The following day she had several severe convulsions with opisthotonus requiring intravenous sodium phenobarbital and pentothal. From that time on, however, she began to improve. During this entire two-week period she had been maintained completely on parenteral fluids. On the 15th day she swallowed several droppersful of water and the next day took orange juice and broth. On the 16th day, while an infusion of casein hydrolysate (amigen, Mead Johnson and Co.), was being administered, her temperature rose to 41.6°C. Mild phlebitis of the vein through which the drip was running was noted and the infusion was stopped. No further amigen was given and sulfadiazine was also discontinued. Blood culture showed no growth; however, from the flask containing the amigen solution nonpathogenic Staph. aureus hemolyticus was isolated. All sedation and penicillin was given up on the 19th day. The tracheotomy tube was completely occluded on the 27th day and removed on the 34th day. Because of marked tenseness of the abdominal and leg muscles, active and passive exercise was started on the 23rd day and continued until discharge on the 51st day after entering the hospital.

Minimal nutritional requirements and sedatives were supplied by means of continuous intravenous infusion for the first 15 days of illness. This infusion consisted of two intravenous sets, connected by a three-way stop-cock with an additional side arm to which a syringe filled with 2%

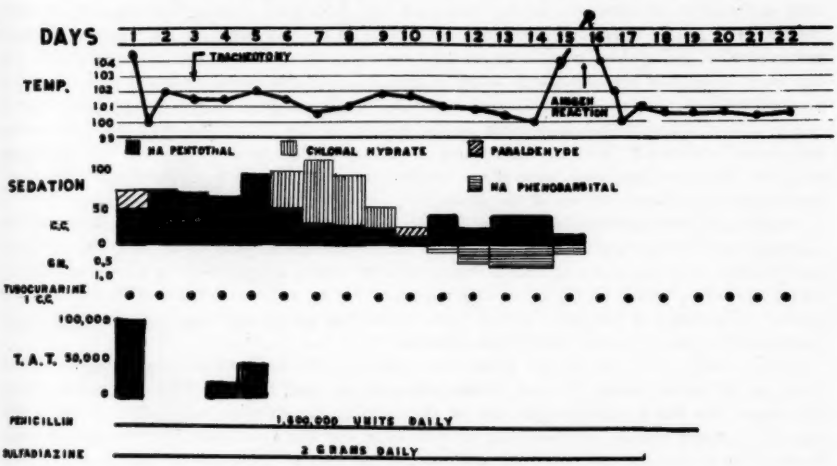
* This material was obtained through the kindness of Dr. Edward B. Schlesinger, Neurological Institute, New York, N.Y.

† Intocostrin-Squibb, a preparation containing therapeutically active constituents of raw (crude) curare.

sodium pentothal was attached. The pentothal was administered intermittently in doses ranging from 1 to 5 cc. to control severe spasms. Great care was taken to prevent the pentothal from coming in contact with sulfadiazine or amigen in the infusion with resultant formation of a fine sediment. For the first four days, between 65 and 75 cc. of pentothal were required each day to prevent or terminate convulsive episodes. The following day much more was needed and on the sixth day it was found more difficult to control the convulsive episodes; as much as 10 cc. of pentothal were required prior to suctioning the tracheotomy tube. Because of this, 7.5% chloral hydrate by rectum was added to the treatment; following this much less pentothal was required. Chart I presents graphically the clinical course and treatment of this patient. While the summation of sedation, as charted, appears to increase during the sixth and seventh day, it must be remembered that equal volumes of pentothal

CHART I

CLINICAL COURSE OF M. C., SHOWING TETANUS TREATED SUCCESSFULLY WITH ANTITOXIN, SEDATION, TUBOCURARINE, TRACHEOTOMY AND ANTIBACTERIAL AGENTS



and chloral hydrate do not result in equal sedative effect. Chloral hydrate was finally discontinued because of rectal irritation, and paraldehyde and sodium phenobarbital were used intramuscularly for supplementary sedation.

Nutrition, for the first 2½ weeks, was entirely by the intravenous route. The daily total of fluids varied between 1,500 and 2,500 cc. and consisted of 5% dextrose solutions, physiologic saline, blood, plasma and 5% amigen with supplements of vitamins B, C and K. A total of 2 gm. sodium sulfadiazine and 1,600,000 units of penicillin daily was added to the infusion at regular intervals. Parenteral fluids were discontinued on the 17th day when she was able to swallow liquids and soft foods.

Curare was used in an effort to supplement sedatives. Before using this agent an attempt was made to establish the dose of curare giving the desired response. Therefore, a test dose of 0.75 cc. curare (Intocostrin) was given intravenously over a two-minute period. Thirty seconds later the patient's eyes began to rove and nystagmus was seen in 1½ minutes. This determined the dose giving the maximum desired response to such an intravenous injection and was considered the largest dose that could be used intravenously to control convulsions. (This maximum intravenous dose was never needed because of the efficacy of the sedation.) During the first 24 hours curare (Intocostrin) was used intramuscularly in 1 cc. doses on three occasions, and 0.4 cc. intravenously once. Thereafter, for the next 33 days, with a two-day omission late in the course, the patient received 1 cc. of d-tubocurarine in wax and oil intramuscularly daily.

A total of 161,000 units of antitoxin was given intravenously and intramuscularly during the first five days. Tetanus antibody titer* of the serum obtained on the 15th day was 8 units/cc., on the 20th day more than 4 units, and three months after onset was less than 0.01 units/cc. Four months after discharge she was started on a routine protective course of tetanus toxoid.

Signs of serum sickness were not easy to interpret because of the severity of the patient's illness. However, on the ninth day a fine erythematous papular rash was noted on the shoulders, back and left thigh. An attempt was made to decrease the allergic manifestations by giving 5 mg. of tripelennamine hydrochloride (pyribenzamine) intravenously. That evening, after routine change of position and suctioning, she suddenly stopped breathing. Positive pressure oxygen and artificial respiration were used for several minutes, after which respirations improved. It was then noted that the cardiac rhythm was grossly irregular; however, it returned to normal after carotid pressure was applied. At this time the blood pressure was 110/70 mmHg. The following day another intravenous dose of 5 mg. of tripelennamine hydrochloride was given because the blotchy erythema was still present. Within three minutes she showed opisthotonus and clonic movements of the left hand and both legs; these stopped after administration of 4 cc. pentothal. Again that evening after a change of position, she became blue, cold and moist; she ceased breathing and the heart rhythm was grossly irregular. Once more oxygen with positive pressure and suction improved respiration but the cardiac irregularity persisted for 30 minutes. Since many new therapeutic aids had been utilized, it was difficult to know whether this collapse was a toxic effect of some drug or a result of the disease. It was thought advisable to give no more tripelennamine hydrochloride and to discontinue pentothal temporarily on the assumption that one or the other might be causing the cardiac arrhythmia. She was maintained on intramuscular paraldehyde alone for 12 hours; after this pentothal was used again for a severe convulsion. No further episodes of this nature were encountered during the rest of the illness.

Studies of liver function undertaken during convalescence revealed a normal bromsulfalein excretion and negative cephalin flocculation. An electrocardiogram taken on the 20th day of illness was normal. Since she had a moderate degree of opisthotonus accompanied by generalized spasms during the acute phase of illness, roentgenograms of the vertebral column were taken. These showed no evidence of fracture. Cultures from the excised wound grew organisms morphologically similar to Cl. tetani. They were not further identified.

Case 2: A.Y., a 4½-year-old white boy, was admitted, who had been unable to open his mouth wide for 36 hours. About 24 hours before admission he tried to eat a lollypop but kept biting his tongue. He had a restless night and on the morning of admission was unable to eat or talk and had frequent jerking and twitching of both arms. He was given penicillin lozenges of which he was able to tolerate two. Since, by afternoon, it had become clear that he had tetanus, he was given 15 mg. codeine and sent to the hospital.

Physical examination revealed an apprehensive child who startled easily, had moderate trismus, and bit his tongue on protrusion. The temperature was 38.3°C., pulse 122, respirations 26 and blood pressure 110/74 mmHg. Several small scratches were noted on the right forearm and both legs. There was no general adenopathy. The neck was moderately stiff, reflexes were hyperactive and the Kernig sign was positive. Eyegrounds appeared normal. The lungs were clear. A mild tachycardia was present. The abdominal wall was moderately tense and the viscera could not be easily palpated. Direct laryngoscopy under pentothal anesthesia showed no abnormality of mouth, pharynx, or larynx.

Laboratory findings included Hgb. 10.5 gm.; RBC 3.62 million/cmm.; normal platelets; WBC 10.3 thousand/cmm. with 61% polynuclear leukocytes, 27% lymphocytes, and 12% monocytes. Coagulation time was three minutes; bleeding time 30 seconds. Spinal fluid sugar was 100 mg./100 cc.; chlorides were 124 mEq./1; protein was 8.5 mg./100 cc. The erythrocyte sedimentation rate three days later was 17 mm./hour. The urine contained one-plus albumin on two occasions and occasional red blood cells. Urine culture grew B. proteus. Blood nonprotein nitrogen was 26.3 mg./100 cc. Mantoux test was negative.

Initially, after skin-testing, he was given 20,000 units of tetanus antitoxin intramuscularly and 40,000 units in 100 cc. of normal saline intravenously. The following day he received, after repeti-

* The tetanus antitoxin titers were obtained through the kindness of Dr. J. M. Ruegsegger of the Lederle Laboratories, Pearl River, N.Y.

tion of the skin test, 50,000 units of antitoxin intramuscularly. Two days later the tetanus antitoxin titer in the blood was 24 units/cc.

Sedation with 2.5% sodium pentothal intravenously was started shortly after admission. During the initial dose laryngospasm occurred, lasting one minute. For the first 12 hours he was maintained easily, with adequate relaxation. Then he had more frequent attacks of twitching of the extremities and opisthotonus requiring 2 to 3 cc. pentothal every half hour. Secretions became more profuse and more frequent suction was needed. Suctioning caused laryngospasm and cyanosis on two occasions and coarse rhonchi were heard throughout both lung fields. Therefore tracheotomy was performed 19 hours after admission with a No. 2 tracheotomy tube left in place. The trachea was full of secretions. There was a most dramatic improvement after this procedure; he had very few spasms and for the next 15 hours required only 10 cc. pentothal; whereas, he had needed 49 cc.

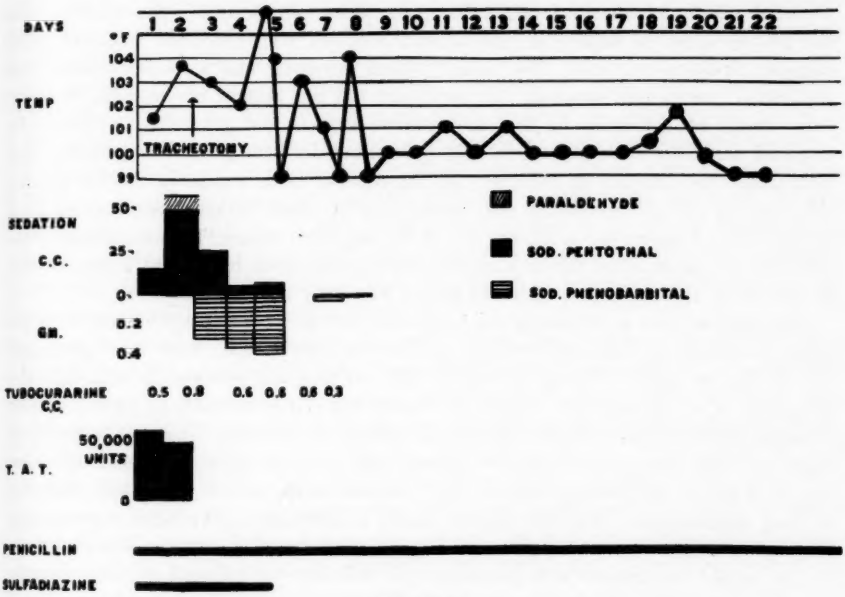


CHART II

CLINICAL COURSE OF A. Y., SHOWING TETANUS, TREATED SUCCESSFULLY WITH ANTITOXIN, SEDATION, TUBOCURARINE, TRACHEOTOMY AND ANTIBACTERIAL AGENTS

during the preceding 18 hours. The schedule of sedation for the next five days is presented in Chart II. Thereafter sedation was not required for spasms.

He had been given 0.5 cc. d-tubocurarine in wax intramuscularly on admission and for the next five days received between 0.6 and 0.8 cc. daily. Also he was given 600,000 units of penicillin and 1.5 gm. sulfadiazine intravenously daily for four days and thereafter 400,000 units of penicillin daily intramuscularly for 19 days. By the fourth day he took fluids by mouth and parenteral therapy was discontinued.

On the seventh day in the hospital he suddenly voided bloody urine with small clots but on catheterization one-half hour later crystal clear urine was obtained. Kidney studies, including intravenous and retrograde pyelography and cystoscopy, revealed no cause for this episode.

On the twelfth day two small pieces of lead pencil were noted imbedded in the hard palate. These were removed and cultures of the site grew many Esch. coli and a moderate number of yeast-like organisms. No organisms similar to Cl. tetani were noted either on smear or culture. He had been playing with a pencil several days before this incident and it was thought possible that he had stuck himself.

The tracheotomy tube was fully occluded on the 14th day and removed on the 20th. The patient was discharged without stiffness or spasm 25 days after admission.

Comment

To evaluate the worth of this treatment it is necessary to consider the seriousness of illness of these patients. The severity of the disease has been judged by Pratt[1] on the basis of four factors: the length of the incubation period, the rapidity of appearance of full-blown symptoms after initial onset, the appearance of the patient on admission, and the frequency and intensity of spasms under sedation. In the first case, the incubation period was short (six days); the first generalized convulsion with cyanosis occurred within 12 hours of onset; the temperature on admission was 40.3°C., and the patient appeared acutely ill; convulsions occurred with moderate frequency after adequate sedation was used. The second patient obviously had a milder disease. The incubation period was unknown; his symptoms did not become severe until 40 hours after onset; on admission he showed moderate trismus and generalized stiffness; he required much less sedation than the first patient but did have generalized spasms when well under the influence of sedatives. On the basis of these standards, the first patient was severely ill and the second was moderately ill. Both patients were treated in a similar manner except for variations due to the degree of illness. Tetanus antitoxin was administered in amounts which were deemed adequate both by clinical judgment and by the serum antitoxin levels obtained several days after administration.

The ideal sedative in tetanus is one which acts rapidly, does not accumulate, does not beget increasing tolerance and does not produce undesirable side-effects after prolonged use for days or weeks. A drug is required that can be given parenterally with ease and with little or no discomfort to the patient. Furthermore, it is advisable to employ a route of administration which assures adequate utilization of the drug. The most satisfactory means of controlling severe convulsive spasms appears to be the intravenous administration of a stable, quick-acting sedative. The thiobarbiturate, sodium pentothal, conforms to these specifications. This drug proved simple to administer, gave rapid response and had minimal side reactions. While pharyngeal irritation may stimulate laryngospasm in any patient anesthetized with pentothal, this difficulty was minimal in these patients. From our observations of the reactions of the first patient it is evident that little accumulation occurred. The doses of pentothal required during the first few days of treatment suggested the development of tolerance. Therefore, other, longer acting sedatives were added to avoid dependence on pentothal alone. The apparent partial lack of dependence of pentothal on hepatic detoxification was another reason for its use. The experience in its administration to patients with advanced cirrhosis seems to corroborate experimental evidence supporting blood stream detoxification.[2-5] So far as we know, this drug has not been used over such a prolonged period of time as in the first case. Hawes[6] in 1945 reported similar use of pentothal in a patient with tetanus, in whom a state of surgical anesthesia was maintained for three days.

Of the supplementary sedatives used paraldehyde was only partially satisfactory. When instilled by rectum it was expelled in varying amount, thus rendering regulation of dosage impossible. Intravenous injection was avoided because of accompanying pulmonary irritation. Intramuscular administration of paraldehyde served to tide the patient over a short interval. Chloral hydrate and sodium phenobarbital were employed to good effect, but not without some anxiety over their possible adverse effect on the

liver. Avertin was not used to avoid central respiratory depression and acute liver intoxication.

It is difficult to decide what part curare played in therapy. Aqueous preparations of curare have been used intravenously and intramuscularly for almost a century, but there has been little opportunity to quantitate the material and to appraise its action until the past 15 years.[7] Cullen and Quinn,[8] reporting in 1943 their experience with curare in the treatment of tetanus, stressed the need for constant observation of the patients. Adriani and Ochsner,[9] in their short series of five cases, indicate that relief of the seizures of tetanus can be secured only with total curarization. Accompanying this are undesirable salivation, cyanosis, and sometimes the need for artificial respiration. Perlstein and Weinglass[10] showed that total curarization of dogs over a prolonged period of time caused death from cardiac failure. This mechanism has not yet been satisfactorily explained and warrants further investigation of autonomic nervous system response. Fatal or nearly fatal results of this kind are in contrast to Smith's unique experiment[11] in which he subjected himself to two and one-half times the total curarizing dose of d-tubocurarine without evoking significant vasomotor or electrocardiographic changes.

The main actions of curare are the peripheral depressant action at the myoneural junction and a central convulsant effect which is ordinarily masked by the peripheral response. Other effects may include a local histamine-like response at the site of injection with formation of a large erythematous wheal. In the prolonged use of curare, symptoms simulating shock have been said to occur. This has been attributed to decreased venous flow associated with diminished muscle tone.

Since intravenous administration of aqueous curare has a transient but powerful effect, we felt it would be safer to use the more slowly absorbed solution in wax and peanut oil[12] to secure a more sustained response. Since curare is more readily soluble in water than in wax and oil care was taken to use dry syringes and needles so as to prevent sudden release parenterally of a large dose in aqueous solution. What effect this agent had on the course of the disease is impossible to evaluate because of the other agents used. In all likelihood, one might expect its action in tetanus to be similar to that in patients with cerebral palsy; that is, that some of the impulses reaching the myoneural junction might be eliminated, thus lessening muscular rigidity. Nevertheless, one of our patients showed a considerable amount of such rigidity even during recovery while receiving curare. Whether the use of drugs which raise the threshold at the myoneural junction is preferable to central depression of the nervous system by sedatives is a moot question. Can the nervous system exhaust itself by pouring out its impulses even though they call forth no response at the end organs? Probably the combination of both modes of treatment is beneficial. Within the last year alpha: beta dihydroxy gamma (2-Methylphenoxy) propane (myanesin) has been used in tetanus with reported benefit,[13,14] this is a drug which mainly depresses the reflex excitability of the spinal cord without causing secondary central stimulation. Its chief disadvantage at the present time lies in its transient effect.

The episodes of collapse and cardiac arrhythmia seen in the first patient are difficult to explain. Cardiac irregularity in tetanus has been mentioned briefly in the literature[15] but little is known about the frequency of its occurrence. In experimental use of curare in dogs[10] death was the result of cardiac failure. In man there is no evidence to confirm this. The clinical use of thiobarbiturates in general anesthesia has caused no significant disturbances of cardiac rhythm although conflicting reports of its effect on animals[16] have

indicated that further studies in man should be undertaken. The finger of suspicion points, then, to the disease itself, to curare, and to pentothal as a possible explanation for these episodes of collapse.

Tracheotomy in cases of tetanus was first recommended by Thomas Curling[17] in 1837. Although he had never done one himself nor had he heard of any patients having been tracheotomized, he suggested its use as a means of combating laryngospasm and laryngeal obstruction. In the past 100 years occasional reports of its use as an emergency measure have appeared in the literature.

The first recorded case is one reported by Humphry[18] in 1856 in a 50-year-old patient with tetanus. The indication for tracheotomy was "to relieve choking and to remove accumulated secretions in the respiratory tree." Following tracheotomy a large amount of secretions was "voided" through the tracheostomy. The patient, however, died a short time later. In 1943, Bustillo[19] reported the case of a patient with tetanus tracheotomized to relieve respiratory obstruction due to spasms of the glottis.

Our first experience of tracheotomy in tetanus involved a 32-year-old male in the Presbyterian Hospital, New York City, in 1935. Although he showed decided improvement in his respiratory signs immediately following operation and after suction of large amounts of secretions from the trachea, he died subsequently of pneumonia.

A 21-month old child was tracheotomized in the Babies Hospital in 1947, at a late stage of the disease when the child did not appear to have any chance of survival. At operation the trachea was found to be filled with thick, tenacious gelatinous secretions. This child died the day after operation. This case and the first case reported in this paper illustrate that the secretions which accumulate and stagnate in the respiratory tree become extremely viscid and would be most difficult to expel even if the individual could cough normally.

In regard to asphyxia, Jackson[20] stated, "A common unrecorded cause is foreign bodies, especially endogenous, of which the number is enormous; these foreign bodies included plugs of mucus, exudates, crusts, membranes, inflammatory products and blood." Accumulation of secretions in the trachea through spilling over from the hypopharynx, loss of cough reflex etc., is coming to be more and more recognized as a cause of respiratory obstruction and today is regarded as a formal indication for tracheotomy.

Spasms of the glottis occur in tetanus. These spasms cause temporary respiratory obstruction which may be controlled by various means. On the other hand secretions which accumulate in the hypopharynx and spill over into the tracheobronchial tree can be dealt with only by means of suction. The use of a soft rubber catheter passed through the nose or through the mouth will readily control hypopharyngeal secretions. To remove secretions from the trachea, however, the tube must be passed through the glottis. It is obvious that repeated introduction of an endotracheal tube is impracticable. Tracheotomy is the only adequate means of dealing with this complication; it assures an unfailing airway and permits easy and complete suction of the tracheobronchial tree.

Experience has shown that tracheotomy may be well tolerated if the patient is adequately prepared for it. It must be emphasized that the tracheotomy should be performed early in the disease, at the first signs of respiratory embarrassment, before it becomes an emergency procedure. The chances of success are greatly compromised if the operation is deferred until such time as the patient has used up all of his "reserves" through repeated attacks of air hunger.

The postoperative care of the patient is of utmost importance and certain precautions

can not be stressed too strongly. The tracheotomized patient requires frequent suction for the first 24 to 48 hours following operation in order to remove not only secretions but blood clots. Suction is hazardous as such severe stimulation may precipitate a tetanic spasm. There is quite naturally an inclination for the observer to defer aspiration until absolutely necessary. This, however, may lead to inspissation of the secretions and permanent plugging of the bronchioles. It is, therefore, preferable to suction the tracheobronchial tree deeply and at regular and frequent intervals. To prevent severe spasms 1 or 2 cc. of a 2.5% pentothal solution should be given intravenously preceding aspiration. If, on the other hand, sedation is so complete that the patient does not cough during the procedure the dislodging of the secretions is incomplete and suctioning does

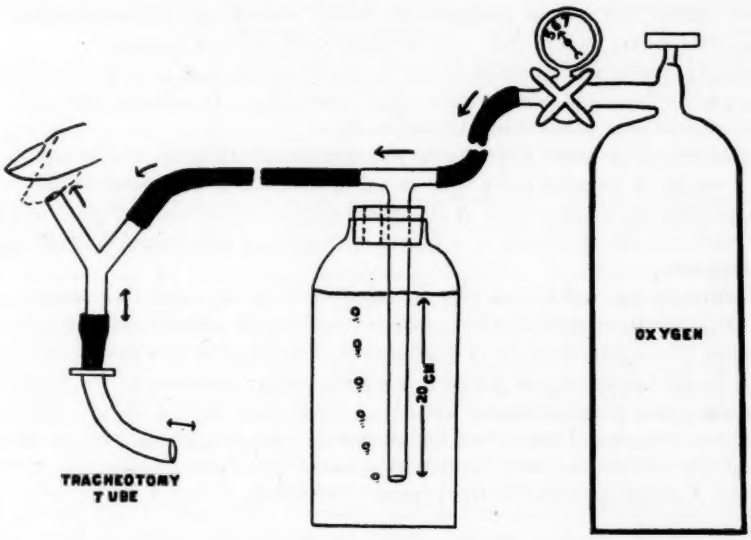


FIG. 1. Apparatus for using oxygen under positive pressure with a tracheotomy tube in place.

not attain its greatest advantage. For these reasons, it is thought advisable to have a physician constantly at hand to supervise medication and suction.

If oxygen is needed adequate means of humidification must be supplied to prevent undue drying of secretions. Furthermore, oxygen should not be insufflated directly into the tracheotomy tube unless there is need for positive pressure, since this tends to drive the secretions farther into the periphery of the bronchial tree. With the use of curare and rapid-acting profound sedatives, it is also imperative to have immediately at hand some apparatus for the delivery of oxygen to the alveoli under intermittent positive pressure. Such apparatus should be at the bedside and in perfect working condition. Respiratory arrest does not allow time to search for or adjust such equipment. With proper resuscitation technic respiratory arrest can be but a minor and transient incident. The equipment need not be elaborate. An adequate apparatus is shown in Fig. 1. An oxygen flow of 5 to 6 l./min., controlled by the conventional reducing valve, may be interrupted by a thumb over the free opening of the Y tube about 25 times a minute to provide

approximately adequate ventilation. The intervening bottle should be adjusted to form a safety valve which will release at pressures in excess of 20 cm. H_2O.

Since most of the other measures used in treating these patients conform to accepted modes of therapy, further detailed discussion is unnecessary. We would like to emphasize the necessity for constant vigil of the patient when treated in such a manner.

Summary

The cases of two patients with tetanus have been presented in detail. One patient was severely ill and the other moderately so. Both were treated with large doses of antitoxin, curare, penicillin and sulfadiazine, tracheotomy and sedation. In the first case, sodium pentothal was used for continuous sedation for 15 days, supplemented with paraldehyde, chloral hydrate and sodium phenobarbital. In the second case sodium pentothal was needed only during the first three days of illness. Both patients recovered.

Sodium pentothal was chosen because of its prompt action when given by vein, minimal toxicity to the liver, and noncumulative effect. Some degree of tolerance was noted and other sedatives were added to supplement its effect.

D-tubocurarine chloride (Squibb) in wax and peanut oil (1 cc. = 30 mg. or 175 units) was given intramuscularly daily to aid in diminishing peripheral irritability and to supplement the sedative effect. A clear-cut evaluation of its beneficial effect is impossible because of the small series of cases and the number of other agents hitherto untried in this disease.

Tracheotomy was used in these patients, prophylactically to prevent fatal laryngospasm, and therapeutically to provide an adequate airway and exit for accumulated thick gelatinous secretions. Few reports of its use in this disease have appeared in the literature. It was felt that it greatly benefitted these patients. Adequate, regular aspiration of the tracheotomy tubes was found to be mandatory while the patients were severely ill and while deep sedation was required. It was found that positive pressure oxygen could be administered through the tracheotomy tube for respiratory arrest while under curare and pentothal sedation. A simple apparatus for this purpose is presented.

References

1. Pratt, E. L., Clinical tetanus, study of 56 cases, J.A.M.A. **129**:1243, 1945.
2. Scheifley, C. H., and Higgins, G. M., Effect of partial hepatectomy on action of certain barbiturates and phenylurea derivative, Am. J. Med. Sc. **200**:264, 1940.
3. Masson, G. M. C., and Beland, E., Influence of liver and kidney on duration of anesthesia produced by barbiturates, Anesthesiology **6**:483, 1945.
4. Richards, R. K., Correspondence; Inactivation of pentothal, Anesthesiology **8**:90, 1947.
5. Kohn-Richards, R., and Appel, M., Barbiturates and liver, Anesth. and Analg. **20**:64, 1941.
6. Hawes, S. C., Pentothal sodium in treatment of tetanus, New Zealand M. J., **44**:22, 1945.
7. West, R., Intravenous curarine in treatment of tetanus, Lancet **230**:1, 12, 1936.
8. Cullen, S. C., and Quinn, C. S., Use of curare in treatment of tetanus, Surgery **14**:256, 1943.
9. Adriani, J., and Ochsner, A., Some observations on use of curare in treatment of tetanus, Surgery **22**:509, 1947.
10. Perlstein, M. A., and Weinglass, A., Fatal effects of prolonged complete curarization, Am. J. Dis Child. **67**:360, 1944.
11. Smith, S. M., et al., Lack of cerebral effects of d-tubocurarine, Anesthesiology **8**:1, 1947.
12. Schlesinger, E. B., Use of curare in oil in treatment of spasticity following injury of spinal cord, Arch. Neurol. and Psychiat. **55**:530, 1946.
13. Berger, F. M., and Bradley, W., Pharmacological properties of alpha: beta dihydroxy gamma (2-methylphenoxy) propane (Myanesin), Brit. J. Pharm. and Chemo. Treatment **1**:265, 1946.

14. Belfrage, D. H., Tubocurarine in tetanus, Lancet **24**:889, 1947.
15. Ferrari, A., Um erro milenario, Rio de Janeiro, 1940.
16. Goodman, L., and Gilman, A., Pharmacological basis of therapeutics, The Macmillan Co., New York, 1941, p. 134.
17. Curling, T. B., Treatise on tetanus, Haswell, Barrington and Haswell, Philadelphia, 1837, p. 20.
18. Humphry, G. M., Cases of tracheotomy; in laryngitis, for foreign body and in tetanus, London Medical Association Journal, **4**:158, 1856.
19. Bustillo, C. C., Tetanos, espasmos de la glotis, trequeotemia curacion caso clinico, Revista Medico-Quir. de Oriente **4**:233, 1943.
20. Jackson, C., Diseases of Nose, Throat and Ear, W. B. Saunders Co., Jackson and Jackson, Philadelphia and London, 1945, p. 474.

SPANISH ABSTRACT

El Tratamiento del Tétanos. Descripcioń de Dos Casos con Comentarios Críticos Sobre Nuevas Investigaciones Terapeuticas

Se presentan detalladamente los casos de dos pacientes con tétanos, uno de ellos de extrema gravedad, y el otro moderadamente grave. Ambos fueron tratados con grandes dosis de antitoxina, curare, penicilina y sulfadiasina, traquestomía y sedantes. En el primer caso se usó pentotal sódico para sedación continua durante 15 días, suplementado con paraldehido, hidrato de cloral y fenobarbital sódico. En el segundo solo fué necesario pentotal sódico durante los tres primeros días de enfermedad. Ambos pacientes curaron.

Se escogió el pentotal sódico por su rapida acción cuando se administra intravenosamente, minima toxicidad sobre el hígado, y carecer de efectos de acumulación. Se observe algún efecto de tolerancia, y añadiendose otros sedantes para suplementar su efecto.

Se administró por via intramuscular diariamente clorhidrato de D tubocurarina (Squibbs) en aceite de cacahuete, (1 cc. = 30 mg. o 175 unidades), para diminuir la irritabilidad periférica y suplementar su efecto sedativo. Una evaluación exacta de su efecto beneficioso es imposible debido al pequeño numero de casos y por el numero de otros agentes todavía no probados en esta enfermedad.

Para prevenir el laringospasmo fatal y terapeuticamente para preveer un libre paso en las vías respiratorias y salida de las secreciones gelatinosas acumuladas, se practica profilacticamente en estos pacientes una traquestomía. Pocos casos referentes a su uso en esta enfermedad han aparecido en la literatura. Se ha considerado que ella beneficia grandemente a estos pacientes. Una adecuada y regular aspiración de los tubos de traquestomía se consideró obligado mientras los pacientes estaban gravemente enfermos y mientras se requería sedación profunda. Una presión positiva de oxigeno se consideró que debía administrarse a través del tubo de traquestomía para descanso respiratorio cuando el enfermo estaba bajo sedación del curare y pentotal sódico. Se presenta un aparato simple para este proposito.

3975 Broadway

FRACTURE OF THE ANTERIOR SPINE OF THE ILIUM

Report of Four Cases and Discussion of Treatment

By J. ROSWELL GALLAGHER, M.D.
Andover, Mass.

FRACTURE of either the superior or inferior spine of the ilium is not a common injury but it is one which should be kept in mind especially by those who deal with adolescents and their athletic injuries. In 1937 Mooney[1] reported the 60th case in the literature and since that time very few other cases[2, 3, 4] have been described in this country's journals. The present report discusses four additional cases, bringing to six the number this author has seen since 1933 in a practice confined to the care of about 700 adolescents a year, and emphasizes the treatment of this disorder.

In a previous paper[5] it was stated that treatment was best achieved by the proper adjustment of a Gatch bed (to allow relaxation of the flexors of the thigh), a method more satisfactory than treatment in a plaster cast. Four subsequent reports,[1-4] however, have described the use of open operative procedures or of plaster casts (hip spica) in the treatment of this disorder. The similarity of those cases to those seen by this observer would make one suspect that a more conservative method of treatment might have been equally effective and might have permitted a much earlier return to practically normal activity. In one of Mooney's[1] cases an incision was made, the loose fragment replaced and a hip spica applied which was removed at the end of six weeks. Cleaves[2] used a plaster spica for six weeks on one case and a figure of eight bandage for an unspecified period on the other. Rush and Rush[3] nailed the fragment in place, applied a cast from the upper third of the thigh to the toes for two weeks, removed the nail after three weeks and allowed weight bearing in one month. Sutherland and Rowe[4] had their patient remain in bed one week, then inserted a nail, applied a spica and kept the patient in bed for three weeks. On the basis of experience with the two cases previously reported[5] in which bed rest for six weeks with knee flexed (but without a plaster spica) had been the treatment for one, and a plaster spica for four weeks the treatment for the other, it was decided to determine whether a more brief and more simple treatment would produce equally satisfactory results. Description of four cases emphasizing the manner of treatment, as well as indicating the circumstances in which this type of injury may occur, follows.

CASE REPORTS

Case 1: F.G., a 17-year-old schoolboy, was injured on October 24, 1934. On that day at football practice his left leg was struck and twisted; the exact region where the blow fell and the precise manner in which the various forces were exerted could not be determined due to the crowded and confused nature of the play. There was immediate and severe pain in the left groin, difficulty in walking and inability to raise the extended leg. There was no nausea or vomiting. On manual examination a grating fragment was felt deep in the left groin. X-ray showed a fracture of the left anterior inferior spine of the ilium.

The patient was put in a Gatch bed in a knee-flexed position. A four-inch ace bandage was applied to his abdomen and around his left thigh, chiefly as a reminder to him that his leg should be kept in a flexed position. A Balkan frame was attached to the bed to facilitate his moving

From the Department of Health, Phillips Academy, Andover, Mass.
(Received for publication May 7, 1948.)

about. The ace bandage was removed on the fourth day, but the patient was kept in bed until the 29th day, when he was allowed up and around on crutches. A X-ray taken on November 22, the 30th day, showed callus formation. He was discharged on the 32nd day without crutches and resumed normal school activities except for participation in athletics.

Case 2: W.C., a 16-year-old schoolboy, was injured on May 26, 1937. At the time of his injury he had run about 60 yards in a 100-yard race when he experienced sudden excruciating pain in the region of the right groin. He immediately had to stop running, sat down, but was not nauseated. On manual examination there was exquisite pain on pressure in the region of the anterior iliac spine and a clicking sensation was made out in the same area. The patient was unable to raise his extended leg. An X-ray showed a fracture of the right anterior superior iliac spine.

An ace bandage was applied, the knee kept flexed, and the Gatch bed arranged as in Case 1. An X-ray taken on June 14, the 20th day, showed extensive callus formation. On the next day the patient was up and about on crutches. On June 19, the 25th day, he was discharged without crutches, and was told to resume normal activities except for athletics. The following September this boy played football without suffering any injury or discomfort related to his iliac spine.

Case 3: T.B., 15½-year-old schoolboy of stocky build, gave no history of any significant bone or muscle injuries except for minor contusions in the pelvic brim area during the football season. Those injuries were not severe enough to suggest the need of medical aid and he did not report them to the trainer or physician. On November 25, 1946, after only one week of practice at track, he was given a "time trial" in the 40-yard dash. In his desire to impress the coach favorably he put forth his best effort and suddenly, when he had covered about 25 yards, he felt excruciating pain in his left groin which caused him to scream out and immediately to stop running. He did not faint or vomit. On examination a few minutes later, swelling over the anterior spine of the ilium was evident, there was exquisite tenderness on slight pressure in that area, and he was unable to raise his extended leg. An X-ray showed a fracture of the anterior spine of the ilium. The patient was put to bed with the Gatch frame adjusted so that his knees were flexed and the feet were braced. No Balkan frame was used. An ace bandage was placed around his lower abdomen and thigh and he was not allowed out of bed until December 12 (18th day). Simple exercises to maintain the tone of muscles other than those in the injured area were begun on November 29 (5th day) and continued throughout his hospital stay. X-rays taken on December 11 (17th day) showed some callus formation. He was allowed out of bed on December 12, was up all day using crutches on December 14, and discharged without crutches on December 18 (24th day). During the Christmas holidays he went to dances but was restricted from skating or other strenuous exercise. On his return to school on January 8, 1947, he was started on supervised exercise which included stationary bicycle riding, medicine ball work, etc. During the spring of 1947 he played baseball and other sports without difficulty or discomfort.

Case 4: L.K., a 16-year-old schoolboy, was injured on November 18, 1947. He gave no history of any previous injury or discomfort in the region of the anterior spine of the ilium. During the autumn of 1947 he had run on the cross-country team and felt he was in good condition. He began his training for winter track in the 600 and 1000 yard events on November 10. Three days prior to his injury he attempted to do some high jumping (Western roll), an event he had never attempted before. He recalls that he was clumsy at it, but he has no recollection of having injured himself in any way. On the afternoon of November 18 he had run (jogging) about 600 yards without any discomfort. On the next lap he noticed a slight pain in the region of his left hip, which seemed to disappear in a few moments as he continued to run. On the succeeding lap he suddenly heard a loud clicking noise at his left groin and "felt something give." There was no immediate pain, but he had to stop running and there was discomfort on attempting to walk and inability to raise his leg. He walked off the track, and was immediately brought to the school hospital where an X-ray showed a fracture of the anterior inferior spine of the left ilium. On examination at that time the boy appeared to be in very little discomfort, but he was totally unable to raise his extended leg and there was marked tenderness on palpation over the region of the anterior inferior iliac spine. He was put to bed and a wide ace bandage was applied to his lower abdomen and about the thigh. A Gatch bed was arranged so that his knee was kept in a flexed position. He was not allowed out of bed for two weeks. An X-ray taken on November 25 showed slight callus formation, and one taken on December 2 showed very extensive callus formation. On November 26 the boy was instructed to do patella setting exercises twice a day following the application of heat (infra

red lamp); this was kept up daily during that week. On December 3 there was absolutely no tenderness on palpation and the patient was able to raise his extended leg easily. He was allowed out of bed on that day and encouraged to walk. At first he walked with hesitation, but he gradually became more confident and despite inclement weather attended all his classes after December 10. During the Christmas holidays he was told that he could go to dances but should not skate or ski or do any other type of strenuous athletics. On his return to school in January 1948 he was given a special exercise program and had no further difficulty or discomfort. During the spring term he engaged in regular competitive athletics (track) without any recurrence of symptoms.

Comment

Four additional cases of fracture of the anterior iliac spine have been reported and indicate that this condition should be suspected when sudden severe pain develops in the inguinal region following either a twisting of the hip or strenuous exertion. The pain occurring at the instant of the injury usually is excrutiating. There may be vomiting, there is difficulty in walking, raising of the extended leg is impossible, tenderness is present over the injured area and crepitus may be felt. An X-ray should be taken of all injuries of this nature to distinguish the iliac spine fractures from such disorders as tears of the quadriceps muscle. Some but not all of these injuries can be prevented by a proper conditioning period of athletics before a maximum effort is expected of them, and a sufficient "warming-up" period each day before such an activity as sprinting is essential.

In none of the six cases which this observer has seen was surgical intervention deemed necessary. In only one case was a plaster spica used, and this only because of inexperience in dealing with this type of injury. The last four cases treated were given no more than bed rest with the knee flexed; the spica ace bandage was certainly of no value except as a reminder to the patient. In these four cases the period of complete bed rest (with knee flexed) was 29, 21, 18 and 14 days respectively. On the basis of this experience it would seem reasonable to consider a period of bed rest of from 14 to 18 days after which the extent of activity advised would depend upon the X-ray findings and the absence of tenderness on palpation or on motion of the hip. To insure proper healing a further period of four weeks during which only walking would be allowed seems advisable; at the end of the sixth week stationary bicycle riding is an appropriate exercise. The end result in each of these cases has been excellent, and this very simple and relatively brief method of treatment is suggested as being as effective as, and more efficient than surgical intervention, the application of a plaster spica or six weeks' bed rest.

Summary

Four cases of fracture of the anterior spine of the ilium are reported; and the conditions under which this disorder develops and should be suspected are discussed.

A period of from two to three weeks of bed rest with knee flexed is suggested as the treatment of choice. Surgical intervention or the use of plaster spica was considered unnecessary in these cases.

References

1. Mooney, V., Fracture of anterior superior spine of ilium, J.A.M.A. **109**:866, 1937.
2. Cleaves, E. N., Fracture or evulsion of anterior superior spine of ilium, J. Bone and Joint Surg. **20**:490, 1938.
3. Rush, L. V., and Rush, H. L., Avulsion of anterior superior spine of ilium, J. Bone and Joint Surg. **21**:206, 1939.

4. Sutherland, R., and Rowe, M. J., Avulsion of anterio superior iliac spine, Am. J. Surg. 57:381, 1942.
5. Gallagher, J. R., Fracture of anterior inferior spine of ilium, Ann. of Surg. 102:86, 1935.

SPANISH ABSTRACT

Fracturas del Ilium de la Espina Dorsal

Cuatro casos presentados de fracturas del ilium de la espina Dorsal acentuan los síntomas que caracterizan esta lesión y el efecto producido bajo un tratamiento conservativo. Esta fractura debe ser sospechada cuando severo dolor se revela en la region enginal durante esfuerzos generales o actividades atleticas. Ocurencia frecuente durante cortas correras le ha dado el nombre de "Sprinters' Fracture." El dolor inicial es severo, y en algunas ocasiones ocuren vomitos; elevar la pierna es imposible y produce dolor en la parte lastínada. Cuando estas señales y síntomas se manifiestan un Rayo X debe tomarse para determinar entre una previa fractura iliaca de la espina Dorsal, o la de una condición de laceración muscular. Algunos de estos daños pueden ser prevenidos si las atletas son sometidos a una preparación antes de hacer sus maximos esfuerzos que les someten a un severo esfuerzo en los musculos del femur. En ninguno de estos casos fue necesaria intervención quirúrgica. Un completo restablecimiento fue seguido después de un corto periodo de descanso en-cama con la rodilla doblada. Un periodo de dos o tres semanas en cama con la rodilla doblada, seguido de aumentados ejercicios fue hallado mas eficaz y practico que sujetar el hueso, aplicar una espica, o seis semanas en cama.

Phillips Academy

POLIOMYELITIS IN FAMILIES ATTACKED BY THE DISEASE

II. The Presence, Appearance, and Persistence of Neutralizing Antibodies

By HERBERT A. WENNER, M.D., AND WILLIAM A. TANNER, M.D.
Kansas City, Kan.

IN A preceding paper by us[1] it was pointed out that whenever poliomyelitis appears in certain households all of the children, and sometimes adult members, have poliomyelitis. Frequently the disease is so mild and nebulous in its clinical behavior[2, 3, 4] that its existence can be determined only by finding poliomyelitis virus in the stool, or, as is less readily the case,[1, 2] in the oropharynx.

If one considers the differences in clinical response among all of the members in a family in which poliomyelitis virus is widely seeded, a natural query arises concerning the appearance and persistence of neutralizing antibodies in these individuals. This inquiry is not a new one, for there are reports[5–9] on the subject which indicate that (a) neutralizing antibodies are widely prevalent in the human population, (b) there is a direct relationship between the presence of antibodies and the age of the individual up to about 20 years of age, and (c) neutralizing antibodies appear and persist in the circulating blood of paralyzed patients longer than in mild and abortive attacks of the disease.

In this paper some data are presented concerning the appearance and persistence of neutralizing antibodies in some individuals residing in households attacked by poliomyelitis.

MATERIAL AND METHODS

Clinical Material.* In 1946 members of households were sampled to delineate the distribution of poliomyelitis virus within family units in which poliomyelitis appeared.[1] Several members in these family units were selected for inclusion in the present study. The history of illness in respective members follows.

Family R.C., Paola, Kan.: This family lived on a farm. On August 5, Mr. C. complained that his legs were stiff and and his arms weak. During the ensuing ten days his symptoms abated. On August 11 Charles, 7, complained that his throat was sore. On August 14 his neck became stiff. He was admitted to a hospital where paralysis of the left arm developed. Ann, 6, became sick on August 13 with fever, 39.4°C., and sore throat. On August 16 she had headache. Her neck was stiff also. Both arms became paralyzed. Mrs. C., 34, did not have a recognized illness (Fig. 1).

Poliomyelitis virus was detected in the stool and oropharyngeal samples obtained from each child, and also from the father. Virus was not found in the stool or throat of the mother.

Family C.D.: On July 25 Larry, 6, had headache, stiff neck and back, and fever 39.4°C. He was admitted to the hospital where he developed paralysis of arms and legs. There is marked crippling as a result of this illness.

There were three other members in his family. Poliomyelitis virus was detected in stool samples

---

From the Departments of Pediatrics and Bacteriology, and the Hixon Memorial Laboratory, University of Kansas School of Medicine, Kansas City, Kan.

Aided by a grant from the National Foundation for Infantile Paralysis.

(Received for publication April 27, 1948.)

* I am indebted to Dr. Floyd Beelman, Secretary of Health, and Dr. C. H. Kinnaman, Epidemiologist, State Department of Health, Topeka, Kan., and to Dr. Hugh Dwyer, Health Commissioner, Kansas City, Mo., for their cooperation in this study.

obtained from four members of this household and in the oropharynx of three of these. Virus was found in the stool and oropharynx of Larry.

Family H.M.: On June 18 Mark, 6, complained of headache. He had fever and vomited. On June 22 he regurgitated fluid through his nose when he swallowed. He was admitted to the hospital. Weakness of the muscles of the pharynx and left arm was found.

Virus was isolated from the stool of this patient. Virus was also isolated from stools obtained from four of five additional family members.

*A.D.** On July 15 Albert, 9, was irritable and had fever 38.3°C. and there was a nasal quality to his voice. There was difficulty in swallowing also. Ninety-one lymphocytes were in his spinal fluid. He recovered from these symptoms within 48 hours.

Virus studies were not carried out on this patient.

Serums: Blood samples were obtained from patients on admission to the hospital. Other members residing in affected households were bled within a few days after the

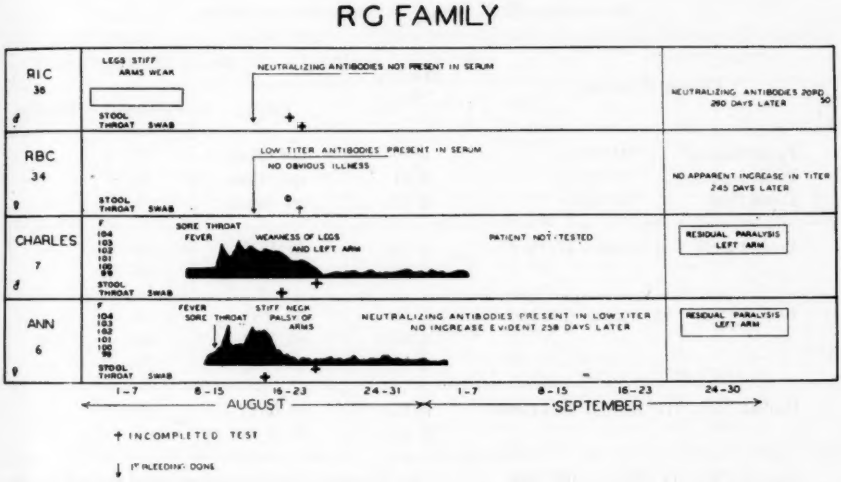


FIG. 1. Schematic diagram of R.C. Family. The horizontal lines represent individuals in the family; their ages and sex are recorded on the left hand side of the figure. The black area delineates time of onset and course of a paralytic attack of poliomyelitis; the open area indicated a poorly defined illness. The presence of virus in throat and stool is indicated by a + sign. In the incompleted test, the monkey died on the third day after inoculation.

appearance of poliomyelitis in a family member. In addition, several blood samples were obtained from these individuals during the following year. The dates of collection appear in the protocols below.

Following clot retraction, and after centrifugation, each serum was decanted to lusteroid tubes and stored at −70°C until used in the neutralization test. The serum was used without previous inactivation (56°C). In some instances there was not enough serum and dilution was necessary to complete the tests (see protocols).

* This individual has been included in order to test the neutralizing antibody response in the transient bulbar type of poliomyelitis. Some of the early serums obtained from members in families were lost in storage, hence serum from another patient was used.

Virus: The MAR strain (or strains) of virus used in the neutralization test was derived from the CNS of three fatal cases of poliomyelitis. These patients died during the poliomyelitis outbreak in the summer of 1946. The history of passage of the strain appears in Table I.

Segments of spinal cord, medulla, pons, and midbrain from rhesus monkeys 1-07 and 1-08 (4th passage) were triturated in a Waring blender. Beef heart infusion broth containing normal rabbit serum (5 cc./100 cc. broth) was added to the blended tissue extract. The final dilution was 1:5. The emulsion was centrifuged at 2500 rpm. for 20 minutes. The supernatant fluid was decanted to a flask, mixed, and discharged into 2.0 cc. glass ampoules (May 28, 1947). The ampoules containing this virus suspension were stored in a dry ice box (−70°C).

TABLE I

PASSAGE OF MAR STRAIN OF POLIOMYELITIS VIRUS

Passage Material		Monkey No.	Fate of Monkey		
			Fever	Paralysis†	Histology
Fatal Human Poliomyelitis Cases 1946	"M"-CNS	R-79	not taken	7	+
	"A"-CNS	R-81	not taken	12	+
	"R"-CNS	R-77	not taken	5	+
Pool of CNS	I. Rhesus 77, 79, 81	R-105	40.5° C.	6	+
		R-106	40.5° C.	6	+
Pool of CNS	II. Rhesus 105, 106	R-78*	40.5° C.	6	+
		R-84*	40.2° C.	6	+
		R-96*	40.5° C.	5	+
Pool of CNS	III. Rhesus 78, 84, 96	R-107	39.6° C.	5	+
		R-108	39.2° C.	5	+
Pool of CNS	IV. Rhesus 107, 108	See Titration. This passage material was used in the neutralization test.			

* Monkeys used in a previous and presumedly negative test.

† The day of paralysis is indicated by number.

Serum-Virus Mixtures: Equal amounts (0.4 to 0.7 cc.) of serum and the selected dilution of virus ($PD_{50} = 10^{-4.3}$) were mixed and incubated at 37°C for two hours. The serum-virus mixtures were removed from the water bath (37°C). These mixtures were frozen in the dry ice chest, and individual tubes were then thawed a few minutes prior to inoculation.*

The serum-virus mixture (0.8 to 1.0 cc.) was inoculated into each thalamic area of a monkey.[10] Four or eight monkeys were used to test each serum-virus mixture.

* In tests in which 30 to 50 monkeys were inoculated during a four to six hour period we have found that serum-virus mixtures quickly frozen following two hours' incubation can be removed and thawed five minutes prior to inoculation. This procedure to our knowledge, has no effect on antigen-antibody union. The method is of value in that serum-virus mixtures are inoculated under identical conditions, and are not subjected to influences related to time of reaction.

Animals: *Macaca mulatta (rhesus)* and *Macaca irus (cynomolgus)* monkeys were used. Animals were observed twice daily. Daily temperature records were kept. Monkeys that developed paralysis were sacrificed shortly thereafter (one to three days). All other monkeys were observed for at least 30 days before they were sacrificed. Most of these animals were observed 40 days and used again in another experiment. None of the animals survived longer than 75 days.

Criteria for Neutralization of Poliomyelitis Virus: No effort has been made to grade

TABLE II

TITRATION OF MAR STRAINS OF POLIOMYELITIS VIRUS
(at its fourth passage in *Rhesus* monkeys)
Sept. 16, 1947

Dilution of Virus	Monkey No.	Fate of Monkey			P/I	Dilution of Virus	Monkey No.	Fate of Monkey			P/I
		Fever	Paralysis	Histology				Fever	Paralysis	Histology	
$10^{-2.4}$	R-156	40.7	6*	+	4/4	$10^{-4.3}$	R-144	—	0	0	1/4
	R-157	40.5	5	+			R-145	—	0	0	(2/4)
	R-158	41.1	8	+			R-146	—	9	+	
	R-159	40.3	7	+			R-147	—	0	+§	
$10^{-2.7}$	R-152	40.8	7	+	4/4	$10^{-4.7}$	R-140	—	7	+	2/4
	R-153	39.7	5	+			R-141	—	6	+	
	R-154	40.5	6	+			R-142	—	0	0	
	R-155	40.7	†	+			R-143	—	0	0	
$10^{-3.7}$	R-148	‡	6	+	4/4	$10^{-5.0}$	R-136	—	0	0	1/4
	R-149	—	7	+			R-137	40.1° C.	10	+	(2/4)
	R-150	—	8	+			R-138	—	0	+‖	
	R-151	—	9	+			R-139	—	0	0‖	

P/I numerator = number of monkeys paralyzed; denominator = number of monkeys used in test.

* Day of paralysis.

† Animal sacrificed just before onset of paralysis.

‡ Temperatures were not taken on the four animals used with this dilution of virus.

§ Developed paralysis of right arm seven days following challenge with 200 PD_{50} doses; homologous strain of virus. The lesions in the cervical cord were of recent origin; in the lumbar cord lesions were old, with disappearance of cellular structure and glial proliferation.

‖ Used in tests with LCM virus.

(2/4) = 2 of 4 monkeys infected disregarding signs and symptoms.

the response of the monkeys inoculated with serum-virus mixtures. In this report, regardless of the incubation period, it is an "all or none" response. The appearance of paralysis, and the presence of typical lesions in the CNS of inoculated monkeys indicates neutralization of virus in the serum-virus mixture, particularly if the animal (a) has no demonstrable lesions in the CNS or (b) succumbs to a challenge inoculation with the same strain.

A limited number of animals can be used in an experiment such as this. Quantitative studies on neutralization of virus by respective antiserums were not completed. Hence, it is difficult to fully evaluate the presence of small amounts of neutralizing antibody in individual serums.

TABLE III

ABILITY OF HUMAN SERUMS TO NEUTRALIZE THE MAR STRAIN OF POLIOMYELITIS VIRUS

	Patient and Age	Type Illness	Days Following Onset of Illness	Final Serum Dilution	Virus PD_{50}	Monkeys	Fate of Monkeys		Neutralization of Virus
Nov. 5, 1947	L.D., 6	P	3	1:3	20	R-185, 190, 195, 200, 206, 211, 216, 221	PPPP PPP	7/8	0
			37	1:3	20	R-186, 191, 196, 201, 207, 212, 217, 223	OOOO POOO	1/8	+
			142	1:3	20	R-187, 192, 197, 203, 208, 213, 218	OOOO OOO	0/7	+
			363	1:3	20	R-188, 193, 198, 202, 209, 214, 219	OOOO OOO	0/7	+
	Control	—	—	—	20	R-184, 189, 194, 199, 204, 210, 215, 220	PPPP PPPP	8/8	0
October 8, 1947	A.C., 6	P	4	1:2	10	R-168, 170, 172, 174	OOPP	2/4	±
			258	1:2	10	R-169, 171, 173, 175	OOPP	2/4	±
	M.M., 6	P	25*	1:2	10	R-160, 162, 164, 166	OOPO	1/4	+
			270	1:2	10	R-161, 163, 165, 167	OOOO	0/4	+
	Mr. C., 36	NP	?	1:2	10	R-176, 178, 180, 182	PPPO	3/4	0
			>260	1:2	10	R-177, 179, 181, 183	OPOO	1/4	+
December 30, 1947	Mrs. C., 34	none	0	1:2	20	C-238, 229, 231, R-203	OOOP	1/4	+
		none	245	1:2	20	C-237, 233, 226, R-209	POOO	1/4	+
		none	0	1:2	200	C-252, 247, 243, R-186	OPPP	3/4	0
		none	245	1:2	200	C-251, 246, 242, R-200	POPP	3/4	0
	A.D., 9	B	3	1:2	20	C-230, 234, 227, R-214	OOOP	1/4	+
		B	9	1:2	20	C-232, 228, 225, R-213	OOOP	1/4	+
		B	193	1:2	20	C-239, 218, 219, R-223	OOOO	0/4	+
		B	3	1:2	200	C-250, 245, 241, R-202	POPP	3/4	0
		B	9	1:2	200	C-249, 244, 240, R-188	POPO	2/4	±
		B	198	1:2	200	C-248, R-165, 217, 201	PPPO	3/4	0
	Control		—	—	20	C-236, 235, R-181, 192, 197	PPPPP	5/5	0
	Control		—	—	200	C-254, 253, R-163, 147, 160	PPPPP	5/5	0

* Early serum obtained from M.M. was lost.

P = Paralytic poliomyelitis; NP = Non-paralytic poliomyelitis; B = bulbar poliomyelitis. C = cynomolgus; R = rhesus; 7/8 = 7 of 8 monkeys inoculated became paralyzed; histologic lesions typical of poliomyelitis present.

Histologic examination has been made of CNS tissue of all animals.

RESULTS

Titration of MAR Strain of Poliomyelitis Virus: At its fourth passage in rhesus monkeys, the strain of virus used in the neutralization test was titrated. The results appear in Table II.

The results of this titration have been examined from two points of view: namely, the delineation of the minimal paralyzing dose (PD_{50}) and the minimal infective dose (ID_{50}). Although this separation is an artificial one, since ID_{50} and PD_{50} are mutually inclusive, there are certain differences. On the one hand, paralysis in its grosser manifestations affords direct evidence of illness. On the other, animals presenting no gross evidence of involvement of the CNS, but infected, can be detected only by histologic examination of the CNS.

The PD_{50} titer was $10^{-4.3}$. ID_{50} titer was $10^{-4.7}$. In the conduct of the neutralization tests the PD_{50} end point was used as the base index. Dosage based on PD_{50} contains about 2½ times more virus than dosage on ID_{50} end point.

TABLE IV

NEUTRALIZATION OF POLIOMYELITIS VIRUS BY HUMAN SERUMS FROM PARALYZED PATIENTS

Name	Degree Paralysis	Day from Onset of Illness	Virus PD_{50}	Monkeys Paralyzed* / Monkeys Inoculated	Result
L.D.	beginning	3	20	7/8	negative
	arms, legs, severe residua	37	20	1/8	positive
		142	20	0/7	positive
		363	20	0/7	positive
A.C.	arms	4	10	2/4	equivocal
	residua	258	10	2/4	equivocal
A.D.	bulbar	3	20	1/4	positive
	scant	9	20	1/4	positive
	none	198	20	0/4	positive
M.M.	arms	25	10	1/4	positive
	slight residua	270	10	0/4	positive

* For control tests see Table I.

Neutralization Tests. General Considerations: Three neutralization tests have been completed. The results of these tests are summarized in Table III.

First, it is evident that the development of neutralizing antibodies in the circulating blood of patients is quite variable following an attack of poliomyelitis. Neutralizing antibodies may be present at the onset of neurologic symptoms, and there may not be an appreciable increase during an attack of the disease; neither may there be a marked rise in titer during convalescence (see A.D. and A.C.). On the other hand, neutralizing antibodies may be virtually absent at the time of illness, and there follows in convalescence an appreciable increase (see L.D. and Mr. C.).

Second, the data in this small series of tests suggest that neutralizing antibodies in convalescence serums are present in relatively low concentrations. Although most convalescent serums neutralized 20 PD_{50} of poliomyelitis virus, certain serums which neutralized this smaller dose failed to neutralize one ten times as strong (200 PD_{50}). Unfortunately, the tests are expensive, and additional titration of the best serums (L. D. and Mr. C.) was not done. Nevertheless, as will be pointed out again below, among the

individuals who had poliomyelitis the antibody response was not of a magnitude which one might expect in this disease.

Neutralizing Antibodies: (1) In Paralytic Poliomyelitis: The results of tests made with serum obtained from paralyzed patients appear in Table IV. Serums were obtained from four individuals during a period extending from 3 to 363 days following onset of a paralytic attack of poliomyelitis.

Neutralizing antibodies were not found in the serum of L. D. immediately prior to the appearance of paralysis, on the third day of illness. On the 37th day an increase in antibody level was detected; seven of eight rhesus monkeys inoculated with serum-virus (20 PD_{50}) mixture were protected. The attempt to demonstrate the extent of increase or decrease in antibody titer was not made, but it is evident that in the intervening period up to a year after onset of illness there was no reduction of antibody level as assessed by the challenge inoculum containing a constant dose of virus.

Serum was obtained from A. C. on the fourth day when paralysis was beginning to appear. The serum neutralizing antibody level was low. Two of four monkeys inoculated

TABLE V

NEUTRALIZATION OF POLIOMYELITIS VIRUS BY HUMAN SERUMS FROM (a) AN ABORTIVE CASE AND (b) AN APPARENTLY HEALTHY MOTHER

Name	Type Illness	Day from Onset of Illness	Virus PD_{50}	Monkeys Paralyzed / Monkeys Inoculated	Result
(a) Mr. C.	Abortive	? 260	10 10	3/4 1/4	Negative Positive
(b) Mrs. C.	None	? 245	20 20	2/4 1/4	Equivocal Positive

with serum-virus mixture (10 PD_{50}) became paralyzed, and two were protected. The antibody level, if it did not increase in the intervening period was approximately the same 8½ months later.

A. D. presented mild bulbar signs on admission. Neutralizing antibodies to poliomyelitis virus (20 PD_{50}) were present in his serum on the third day of illness (bulbar symptoms present). These antibodies persisted, and possibly increased in titer within the next six months.

Neutralizing antibodies were present in serum from M. M. on the 25th and also on the 270th day following onset of illness.

In summary, neutralizing antibodies appear during illness or during convalescence in poliomyelitis. In some patients antibodies appear early in the clinical course of the disease. Quantitative studies are necessary to determine whether neutralizing antibodies reach a maximum, and thereafter a more or less steady level within a few days to a week following onset of those symptoms which are prodromal to paralysis. There is some evidence in these data to suggest that this may be so; admittedly it is not on a firm bed-rock of information.

(2) In Abortive Poliomyelitis: Mr. C. had a poorly defined illness. Poliomyelitis virus was detected in his stool and in the oropharynx. Serum obtained at the time virus was found in oropharynx and in stool contained neutralizing antibody in low titer (Table

V). There was an apparent rise in antibody titer in the interim and about nine months later a relatively, but not an absolutely greater degree of protection was afforded monkeys inoculated with the serum-virus mixture (10 PD_{50}).

(3) In an Apparently Healthy Mother: In a previous study[1] in families attacked by poliomyelitis, three of four mothers escaped infection. Serum was obtained from one of these mothers (Mrs. C.) shortly after the onset of poliomyelitis in her children, and again nine months later. The results of the neutralization test appear in Tables III and V. It is evident that neutralizing antibodies were present in the mother's serum (in low titer)

TABLE VI

NEUTRALIZATION OF POLIOMYELITIS VIRUS BY MEMBERS OF R.C. FAMILY

Name	Virus PD_{50}	Early Serum	Late Serum	Results
Mr. C.	10	3/4	1/4	Positive
Mrs. C.	20	2/4	1/4	Equivocal
A.C.	10	2/4	2/4	Equivocal

Three monkeys of four inoculated became paralyzed.

at the time of appearance of poliomyelitis in the household, and that there was no appreciable increase during the ensuing nine months.

(4) In Members of a Family: Three of four members of the R. C. family were studied; namely, Mr. C., who had abortive poliomyelitis, Mrs. C., who was not ill, and A. C., who had a paralytic attack. The remaining member (C. C., 6) also had a paralytic attack of poliomyelitis. His serum was not tested. Each of these three patients has been discussed above.

Considered as a group (Table VI) it is impressive that the antibody titer did not increase appreciably in any of the three individuals studied, regardless of the duration of illness, if any, or of the presence or absence of paralysis.

DISCUSSION

The results obtained in this study indicate that neutralizing antibodies do appear following an attack of poliomyelitis. They may be present early in the clinical course of poliomyelitis, and they may not increase to an appreciable extent in the months following. On the other hand, the magnitude of rise in antibody titer can be marked. The increase in titer varies with the individual, and probably with the severity of illness. Quantitative serologic studies would be necessary to fully define these latter points.

It is clearly evident that the neutralizing antibody titer in some patients ill with poliomyelitis does not reach a high level. Serum from one paralyzed patient barely neutralized 10 PD_{50} of poliomyelitis virus. Although a rise in titer may have been missed, an increase was not evident in serum collected eight months from onset of illness. Mr. C., who had abortive poliomyelitis did not develop antibodies of a remarkable difference in convalescence. Serums obtained from two other patients (Mrs. C. and A. D.) protected monkeys inoculated with 20 PD_{50}, but most of the monkeys inoculated with a virus concentration of 200 PD_{50} developed poliomyelitis.

It is equally clear that there is no appreciable loss of neutralizing antibody among the six individuals studied, at least up to a period of one year from onset of illness.

It is our impression that the antibody response may be stimulated somewhat more

vigorously in a paralytic than in an abortive attack of poliomyelitis. This point was made in an earlier work by Trask and Paul.[9] Additional study along this line of thought is indicated, particularly in determining the time and extent of the maximal rise in antibody titer in paralytic and abortive attacks of poliomyelitis. The ratio of antibody in blood and CNS tissues[11] in fatal human cases should be explored also.

It should be mentioned that the strain(s) of poliomyelitis virus used in these neutralization tests appears to share in a large degree the antigenic mosaic of the individual strains responsible for illness in the patients we have studied. We do not mean to say that the strains were identical; on the other hand, we have no evidence that they are not. Had we used each individual's strain in the estimation of the neutralizing antibody titer some differences may have appeared. Whether such a study would vary markedly in its results as compared with these obtained is difficult to say.

It is now evident that strains of poliomyelitis virus differ somewhat in their antigenic mosaic, and possibly these differences may be responsible for variances in antibody response (as tested with one strain of virus) in the infected host. Moreover, as Trask and Paul[9] have pointed out, individuals may have several abortive attacks of poliomyelitis. These attacks stimulate antibody production in varying degree, but it does not appear likely that such antibodies ever reach high levels. Such individuals following repeated small insults may develop antibodies with a broad overlap in respect to antigenic differences among strains. Nevertheless, in studies such as this one, and particularly in studies of children, the strain native to the outbreak should be used.

Summary

A study has been made concerning the presence, and persistence of neutralizing antibodies to poliomyelitis virus in six individuals. Five individuals had poliomyelitis; the remaining subject was a familial contact.

Neutralizing antibodies do appear in the serums of patients convalescent from poliomyelitis. In this study neutralizing antibodies, as a rule, appeared during the first ten days of illness. There is the suggestion that these antibodies appear rapidly, quickly reach their highest level, and that there is little if any fall in titer during the ensuing year.

The neutralizing antibody titer may not reach a high level in a considerable number of patients.

References

1. Wenner, H. A., and Tanner, W. A., Poliomyelitis in families attacked by disease. I. Distribution of virus in stool and oropharynx of members in households, Am. J. Med. Sc., in press.
2. Paul, J. R., and Trask, J. D., Detection of poliomeylitis in so-called abortive types of disease, J. Exp. Med. **56**:319, 1932.
3. Trask, J. C., Vignec, A. J., and Paul, J. R., Isolation of poliomyelitis virus from human stools, Proc. Soc. Exp. Biol. and Med. **38**:147, 1938.
4. Paul, J. R., Salinger, R., and Trask, J. D., Studies on epidemiology of poliomyelitis; incidence of abortive types of poliomyelitis, Am. J. Hyg. **17**:601, 1933.
5. Muckenfuss, R. S., and Schaeffer, M., Experimental Poliomyelitis, published under the auspices of the National Foundation for Infantile Paralysis, Inc., Science Press Printing Company, 1940.
6. Turner, T. B., and Young, L. E., and Maxwell, E. S., Mouse-adapted Lansing strain of poliomyelitis virus; neutralizing antibodies in serum of healthy children, Am. J. Hyg. **42**:119, 1945.
7. Brown, G. C., and Frances, T., Jr., Neutralization of mouse-adapted Lansing strain of poliomyelitis virus by serum of patients and contacts, J. Immunol. **57**:1, 1947.
8. Paul, J. R., and Trask, J. D., Neutralization test in poliomyelitis; comparative results with four strains of virus, J. Exp. Med. **61**:447, 1935.

9. Trask, J. D., and Paul, J. R., Neutralizing antibodies in abortive poliomyelitis, J. Exp. Med. **58**:531, 1933.
10. Howe, H. A., and Bodian, D., Neural Mechanisms in Poliomyelitis, The Commonwealth Fund, Oxford University Press, New York, 1942.
11. Morgan, I. M., Role of antibody in experimental poliomyelitis; distribution of antibody in and out of the central nervous system in paralyzed monkeys, Am. J. Hyg. **45**:390, 1947.

SPANISH ABSTRACT

La Poliomielitis en Familias Atacadas por la Enfermedad. II. La Presencia, aparación y persistencia de anticuerpos neutralisantes

En un trabajo anterior se puso de relieve que la poliomielitis ocasionalmente efecta muchos miembros de una casa, aunque no todos desarrollan poliomielitis paralitica. Una pergunta natural se levanta concerniente a la aparación y persistencia de anticuerpos neutralisantes en algunos de estos individuos.

En este estudio se investigaron los sueros de 6 individuos. En el suero de pacientes convalecientes de poliomielitis, aparecieron anticuerpos neutralisantes. Como regla, estos anticuerpos aparecieron durante los diez primeros días de enfermedad. Se sugiere que estos anticuerpos aparecen rapidamente, alcanzando pronto un alto nivel, y que hay poca o ninguna concentración durante el año que sigue.

La concentración de anticuerpos neutralisantes puede no alcanzar un alto nivel en un considerable numero de pacientes.

Bell Memorial Hospital

GUIDANCE IN MATERNAL AND INFANT CARE TWO MONTHS BEFORE AND AFTER THE BIRTH OF THE FIRST-BORN

By AUGUSTA STUART CLAY, Ph.D.
Savannah, Ga.

THIS study was made in the belief that family living and growth can be healthier if parents understand how mother and baby develop and what they need.

Eleven mothers were visited weekly for two months before and after the birth of their firstborn to discover what guidance they wanted, what was offered, and what additional guidance was needed. The writer secured their cooperation by agreeing to work with them as a consultant, to interpret their point of view to the doctor, to explain medical instructions when permitted, and to teach the normal growth processes of mother and baby.

Ten mothers were registered in the prenatal clinics of the New Haven Hospital;* the eleventh had a private physician. They had no recorded problems beyond the needs of healthy pregnancy and they wanted to participate. Eight husbands agreed to take part in the study. The other three were overseas, but their wives reported for them. Backgrounds varied; 20 of the 22 had had college or high school education; all were between 18 and 32. None dropped out, and after the four months all asked for continued guidance.

Cases were too few and the study too brief for statistical evidence. But problems were uncovered which needed to be considered and which have largely been neglected in routine obstetric and pediatric care.

These parents wanted to learn—not in classes, but in the privacy of home—how to care for mother and baby without disrupting their accustomed way of living. All wanted the care and interest of one doctor for mother and one for baby. However, six women and five men preferred to talk with a consultant who was not a doctor, but who was affiliated with their doctors. The doctors seemed too busy for "little things" and "family affairs," and they saw so many doctors that they all seemed strangers. Once they felt sure that the consultant's interest was in themselves rather than in teaching them, they set the pace and pattern in the conference. There was no questionnaire, no probing, no set procedure. If they had any immediate interests or problems: job, move, presents, trips, in-laws, illness—these were discussed before they talked of pregnancy and baby.

They all talked about their childhood and parents before they planned for the baby. Seven mothers and five fathers reported good relations with their parents. They looked forward with pleasure to the baby as an individual and already a beloved member of the family. The four mothers and six fathers whose relations with their parents were reported difficult regarded the baby as a possession. All but one anticipated behavior problems, planned not to spoil him, wanted to train him as soon as possible to do as they wished. Guidance with them had to be slow and indirect. In the two couples where relations differed, approach was made through the one with congenial parent relations.

As they talked, parents began to find how to include the care of mother and baby in

---

Report of unpublished thesis. Presented to the faculty of the Graduate School of Yale University in candidacy for the degree of Doctor of Philosophy.

* Now The Grace New Haven Community Hospital.

(Received for publication April 23, 1948.)

their way of life. They learned to report daily behavior; and, through reporting, saw how food and rest affected the mother's condition and the baby's welfare. They wanted to know the reasons for the directions the doctor gave, and when fully informed followed them better.

Their attention was called to the mother's sudden hunger, restlessness, fatigue, cramping pains, and difficulties in relaxing and sleeping. It was explained that she had these sensations because she was growing rapidly and that the baby would feel the same way after birth. When the mother and father talked of how irritated she would be if forced to a strict schedule before birth, they began to see how the baby, too, would be irritated if forced to a strict schedule and that he needed to be helped to regulate himself in his own way.

Parents seemed to feel too pressed by increasing responsibilities to seek information from any source. Only one couple went to the library for books. None read the pamphlets given by the clinic. They said information in books was too impersonal and they could not put theory into practice without help. But when the consultant brought books and pamphlets to them with sections marked pertaining to their questions, they read and discussed what they read.

Five mothers enrolled in the mothers' classes of the New Haven Visiting Nurses Association. One completed the ten lessons. Four stopped after one or two. They said they were told so much to do they felt they could do nothing; they could not ask their personal questions in public; and the long sitting tired them. But two said the lecture on breast-feeding had decided them to nurse. One father attended classes for fathers.

Visiting nurses called on ten of the mothers during pregnancy and planned with them to visit after the birth. The prospect of their help reassured the parents.

Interest in the baby followed a regular sequence. As soon as pregnancy was sure, they wanted, especially the father, to know the care the mother needed. When both felt the baby move they wanted to know how he was developing. Interest in his growth and behavior increased from the fourth to the eighth month and the more parents learned about how his parts developed and how he was using them, the more he became a personality to them rather than a possession. His sex mattered less and his strength and temperament more.

Towards the eighth month the mother became apprehensive. She had bad dreams, feared the baby would be malformed, was anxious about delivery. She was ashamed to let the doctor know her fears, but turned to her husband, and he wanted to know how to help her. With two exceptions, each father's kindness to his wife increased. But each said he felt the doctor was taking the care of his wife completely from him when he most needed to be helping her; he did not know how to reassure her, because neither her condition, her treatment, nor how he could help her was explained to him. There was no provision for him at clinic, with her or alone. One husband asked for a conference with the doctor. He said the request was resented and the conference unsatisfying.

In the last month, the mother's fears lessened. She was more comfortable after the baby dropped; worked hard on his supplies; had surprising bursts of energy. Each wanted to discuss delivery but said that since the doctor would take charge and give her anesthesia, she felt no responsibility in giving birth. However, one mother suggested that Read's "Childbirth Without Fear" be loaned to all mothers, because Dr. Read told the mother what she could do rather than what would be done to her.

At the same time, the father's tension mounted. Two spoke of nightmares; one lost

his job; all complained of work pressure, of expenses. All but one asked about childbirth and exactly what to do when labor started. And (may Psychosomatic Medicine take note of "sympathy pains") three became ill: one was hospitalized for tuberculosis the day wife and baby came home; one for kidney colic when told his wife's labor would be induced; the third said he had severe abdominal cramps which he thought was appendicitis during his wife's labor.

When parents had not wanted their baby nor expected to enjoy him, they talked about this. When they learned that others had the same trouble and that the consultant did not blame them but would help them adjust to the baby, they seemed to relax. Then they began to welcome the baby.

Just before the birth, parents asked about hospital regulations and medical treatment. If answered fully, their anxiety subsided. If information was withheld, fears beset them. Supplies were forgotten, or the mother was negligent of her health. When frightened, she would speak resentfully of pregnancy and seem to enjoy doing what she had been told might harm self or baby. Nine showed this tendency.

As assurance of the consultant's interest increased, parents gave information not given doctors or nurses. Sometimes the mother was upset by the doctor's examination and forgot what she wanted to tell and to ask. Sometimes she felt a lack of interest in her personal life. Only when a situation became acute did the facts and problems she had withheld appear on the doctor's records. Then different or additional medical care was given—with results in each case indicating that earlier treatment would have been more effective.

During labor and delivery many of the mothers and fathers wanted to be together. They felt timid in the strange hospital with unknown doctors and nurses. The waiting in the hall on "The Bench" distressed the father. The cries of other women in labor upset the mother. If she was left alone her fear increased. Often she did not understand directions and could not cooperate. Some spoke of added confusion from drugs, of mortification at loss of self-control. Usually the mother who had had a difficult delivery was depressed during hospitalization, slower to welcome the baby, less willing to breastfeed, reluctant to resume marital relations. Six mothers had lacerations; four were delivered with low forceps, three had infections; others had complications. One of the two with toxemia during pregnancy was hospitalized 20 days. The others were dismissed on the eighth day.

Mothers were rebellious against hospital regulations. They were confused by the conflicting guidance which resulted from lack of integration of the departments of obstetrics and pediatrics, from divergent opinions among the pediatricians, obstetricians, and nurses on values of breastfeeding and self-regulation feeding versus a four-hour schedule. This confusion increased with rotation of staff, of medical students, and student nurses. Both mother and father were worried about not being kept fully informed of the condition of mother and baby and not being given specific instructions for home care. In some instances, the mother's separation from her baby intensified her concern.

Parents turned to consultant to discuss these problems. They requested separate conferences so they might spend visiting hours together alone. In these conferences, they voluntarily reviewed their experiences during the birth. Fathers spoke of fear, loneliness, need for professional explanation and reassurance. Mothers spoke of need for instruction from the doctor prior to labor and for personal interest and continuous care.

Mothers who were breastfeeding wanted their husbands with them at nursing time. Finally, in a few cases, when the mother was in a private room the father was permitted

to scrub, put on a doctor's coat and visit. His interest and encouragement stimulated success.

Most mothers asked the consultant for help when breastfeeding and for specific instructions; said they felt frightened; wanted help in holding the baby.

All the mothers wanted to be told repeatedly that the baby was all right and to have each of his good points noted. Those who had not accepted him were tense when near him, slow to name him, did not enjoy his feeding whether by breast or bottle. But every mother was distressed if the baby cried, discouraged if he did not wake or refused her breast. Then she was quick to say her milk was inadequate, slow to see his difficulty in learning to nurse and his weakness and fatigue from being born.

Fathers enjoyed the baby more when they were permitted to hold him. Both parents were more gentle when they understood how new it was for him to breathe, eat, sleep, eliminate. They were more inclined to a self-regulatory schedule for him when told he would find restrictions as hard to bear as his mother found the hospital regulations, which set only certain times for bedpan, for ice water, for visitors.

Two mothers were permitted to breastfeed on a three-hour schedule. Their discomfort from too full breasts and sore nipples decreased and the babies seemed less fretful.

The staff's interest in breastfeeding increased. The consultant's reports that the mother's opiates made the baby drowsy, her cathartics gave him loose stools began to be noted. Some pediatric internes had not read the mother's records daily and had not been aware of her medication or its effect on the baby through her breastmilk.

Half the parents wanted the baby in his mother's room. This had been tried several times in the hospital over a period of years but never quite successfully. In a preliminary study by the writer, it had been tried again with one mother while the writer was out of the city. Again it had failed. A possible reason given by the staff was lack of cooperation between obstetricians and pediatricians. The reason given by the mothers' "grapevine" was insufficient nursing care.

In the present study, permission was secured to try again with one couple. The consultant told the parents and the grandparents with whom they lived what they could expect and what was expected of them, and thus secured their confidence and cooperation. Obstetricians and pediatricians cooperated. A student nurse was assigned as special nurse to mother and baby. The new obstetric nursing supervisor who was heartily in favor of the plan then directed the nursing care. The experiment succeeded. This was the first completely successful experiment in "Rooming-In" in the New Haven Hospital. This mother had no visitors except husband and mother. She nursed easily whenever the baby was hungry, in spite of a difficult delivery and perineal abscess. When she was sent home there was no confusion nor any diminishing of breast-milk. In the hospital, mother, father, and grandmother had learned the baby's ways and the care he needed. They saw when he was hungry and fed him before he cried. They kept him warm and dry and comfortable. And family advice was not conflicting. The mother quickly regained strength and the baby flourished.

When the other mothers went home, confusion followed. They seemed to forget theories of child care discussed before delivery and to remember only what they had experienced at the hospital. They tried to carry out the hospital's rigid schedule. Each mother said she feared to overload the baby's stomach by feeding him more often than every four hours. Only one mother, who had helped with younger children, could tell

the baby's signs of hunger, thirst, fatigue, wet pants, cold, heat, light, noise, or lack of support. When the other babies cried, the mothers' confusion mounted and breast-milk diminished.

Crowded quarters made life harder. Home was seldom as warm as the hospital nursery. The baby was chilled in bathing and changing; frightened by inexperienced handling. When "shown-off" to visitors his distress became acute. The mother turned to the father. He, too, was tired and confused but if he relinquished his responsibility to mother-in-law or helper, the mother turned from him to the one who aided her. Then the father felt neglected and the mother neglected the baby. When the father was out of town, the baby was more fretful and less responsive.

During the first two weeks at home, parents usually called the consultant twice a week, then regular weekly visits were resumed. They wanted to discuss specific problems of feeding and bathing the baby and ways to make him comfortable without spoiling him. Since the mother frequently overtaxed her strength, the father wanted to know the care she needed. As they reviewed the past 24 hours, they saw that when the mother was tired or undernourished the baby cried often and when she took care of herself his behavior usually improved. They found behavior day reports of mother and baby helpful. When difficulties were persistent, parents were more patient if the cause of the baby's crying could be explained.

Nine mothers had attempted to nurse. Two stopped within a few days. Then they were depressed, temporarily lost interest in the baby. One disliked breastfeeding. The other, an intelligent, balanced, generous mother, said she would have continued if taught or encouraged but could not, without help, get her baby to take the breast. Her fear of delivery had increased during labor because the doctor had been slow to come and she was told not to "bear down" until he arrived. The baby was cyanotic, developed respiratory and feeding difficulties. She was not fully informed of his condition nor of his need for help in nursing.

In the first two weeks following hospitalization, two mothers who had had marked periods of depression during pregnancy and hospitalization discontinued breastfeeding. Their depression had returned and each neglected her baby or tried to force him to a schedule suiting her convenience. The crying of these babies increased and their development lacked balance. These two mothers were finally referred by their doctors to psychiatrists, one during and one four months after the close of the study.

Five mothers who fed by bottle from birth or within the first month of life were on poor terms with their parents. They were self-indulgent, unstable. Four were careless, one over-meticulous of their own health. All complained of nervousness. Only one regained strength quickly. They fed their babies by schedule or irregularly to suit their own convenience. All of the bottle-fed babies' growth was inferior to the growth of the breastfed but the care and condition of these babies showed gradual improvement. Both fluctuated in the two cases where the mothers were referred to psychiatrists.

The five mothers who nursed four months or longer and the one who bottle-fed after failing to get her baby to take the breast seemed congenial with parents, husband, and baby. These mothers soon learned to take good care of themselves because their milk did not satisfy the baby if they were tired or their diet inadequate. They were the first to develop their own technics of baby care, note his signs of growth, ask about the next stage of development, resume reading, suggest ways to help other new parents. Their husbands, too, were more interested, more cooperative.

But the condition of the nursing mothers varied at the close of the study. One had had toxemia and a very difficult delivery followed by an infection. It was this mother who was hospitalized for 20 days. She had not fully recovered when the study ended. Her baby, too, had had a difficult start. He was drowsy, slow in feeding and developed thrush while in the hospital. His recovery was slow but steady.

One mother disliked breastfeeding but nursed because she believed it best for her baby. She was tired, depressed, and thin until she weaned at four months. Her baby was held to schedule and seldom rocked. The baby also stayed thin.

The other breastfed babies were soon fed on a self-regulatory schedule and rocked when fretful.

At the close of the study, medical and psychologic examinations indicated the breast-fed babies seemed to be the healthiest and happiest in spite of complications before and during birth.

By the end of the study all of the parents were offering suggestions for new parents: snap-on diapers; references for mothers' helpers and baby sitters; firms with reliable and economical supplies; books; clippings; magazines; lullabies and jingles; snap-shots of fun with baby; and how to lessen red tape at clinic.

They continued to drop in at the consultant's office for months. They seemed to want a familiar place to relax and talk freely about personal problems or the baby's behavior before or after clinic visits.

It is interesting to note the guidance parents wanted over and above that offered by the existing services:

1. They wished to learn together about the growth of mother and baby in the privacy of their own homes rather than in classes.
2. They discussed plans for the baby in relation to their own childhood experiences.
3. They asked to be fully informed of the condition of mother and baby and the reasons for the treatment the doctor prescribed.
4. They liked to have books and other material brought to them with specified reading relating to their immediate interests; to talk about what they read, and to evaluate its usefulness.
5. They wanted one obstetrician, pediatrician, nurse, consultant and, if necessary, one social worker, responsible for their care from admittance to discharge from the clinic.
6. They wanted to be able to be together during labor and delivery if they so desired.
7. They requested that the father's visits not be limited to visiting hours.
8. The mothers said they needed a self-regulatory schedule for bedpan.
9. They said parents should be able to have the baby in the room with the mother if they so desired.
10. All asked to have the father visit when the baby was nursing with permission to help the mother with the baby.
11. The mothers requested specific teaching and help in breastfeeding.
12. Both fathers and mothers asked for consistent guidance in hospital and home care of mother and baby.
13. They wanted to have guidance continue throughout infancy following clinic visits after the first two months and at home when needed.
14. They welcomed the opportunity to share what was useful with other parents.

SPANISH ABSTRACT

Direcciones Para el Tratamiento de Madres y Niños, Dos Meses Antes y Después del Nacimiento del Primer Hijo

Para conocer bien que direcciones los padres desean, que se les puede ofrecer, y lo que necesitan como preparación para el nacimiento del primer hijo, once matrimonios fueron visitados semanalmente. Diez madres eran de las Clínicas del New Haven Hospital, la otra con su propio medico. Los registros nos indican que no hubo ningun problema fisico con preñadez en la que las madres estaban bien de salud.

La mayoria de los padres no desean atender clases, prefieren discutir sus problemas personales, la infantia y el cuidado necesario para la madre y el niño con un consultante en su propia casa. Los padres que han tenido una infancia feliz anticipan felicidad con el primer hijo; para esos menos afortunados, disciplina y preparación.

Cuando el cuidado medico fue explicado a los padres su cooperación fue mas competente. Cuando se les indicó que el subito apetito, cansancio, y calambres era el resultado del avance en preñadez, y que el niño tendría las mismas síntomas después de su nacimiento, realizaron que una continua rutina les irritaría.

Instrucción a los padres acerca del desarrollo de los hijos antes y después del nacimiento tiende a que realicen que el niño es una persona y no una posesión.

Muchos de los matrimonios querían permanecer juntos durante el parto y cuando la madre amamantaba. La madre deseaba aprender como amamantar al niño. Cinco matrimonios desearon que el niño permaneciese en el cuarto con la madre. Una de ellas recibió este privilegio. Solamente el esposo y madre le visitaron. El Niño mamaba cuando tenía apetito. Cuando la madre y el niño regresaron a la casa ya dados de alta, no hubo confusiones ni disminución de leche de pecho como en otros casos.

Cinco madres que amamantaron sus hijos por cuatro meses o mas, la higiene y salud de ellas y los niños fue excelente.

Los matrimonios dijeron que estas conversaciones personales les ayudaron a comprender el desarrollo de preñadez, y como adaptarse a estas circumstancias. Nos dijeron que podían explicar estos problemas con mas libertad a un consultante que a un grupo de medicos, demasiado ocupados, o sin interes en problemas personales.

Confundidas por contradictorias direcciones de obstetricias, pediatricos y enfermeras, al consultante le dieron información perteneciente al diagnosis rehusadas al doctor, enfermera, y al auxiliador social.

75 DeRenne Apartments

Pediatrics

VOLUME 2 AUGUST 1948 NUMBER 2

AMERICAN ACADEMY OF PEDIATRICS, INC. PROCEEDINGS AND REPORTS

REPORT OF THE MEETING OF THE ACADEMY EXECUTIVE BOARD

Hotel Statler, Buffalo, N.Y., April 29-30, 1948

A special meeting of the Executive Board of the American Academy of Pediatrics was held at Hotel Statler, Buffalo, N.Y., on Thursday, April 29, 1948. The meeting was called to order at 7:50 P.M. by the President, Dr. John A. Toomey. There were present Drs. Toomey, Sisson, Pease, Martmer, Grulee, Stringfield, Beaven, Barba, London, Wishropp, Munns, McElhenney, Spickard, McLendon, Snedeker, and by invitation, Drs. Joseph S. Wall, Coursen B. Conklin and John P. Hubbard.

It was moved, seconded and carried that when speakers are asked to appear on programs at meetings, they should receive 7½¢ a mile for travel, and ten dollars a day for the time in service at the meeting. When they ask to appear on programs at meetings, they should not be reimbursed.

The Board went into executive session and after due deliberation the following resolution was adopted: "A committee of three members of the Executive Board shall be appointed to confer with the Board of Trustees of the American Medical Association and place before them the proposal, which has been passed by the Executive Board of the Academy, that there should be Federal subsidy for the teaching of pediatrics in the medical schools."

The President appointed the following Committee: Drs. Beaven, Sisson and Munns. Dr. Harvey F. Garrison, representing the Academy as liaison officer to the American Medical Association, was added to this Committee.

The meeting recessed at 11:50 P.M. and was called to order at 9 A.M. April 30, 1948, by the President.

It was moved, seconded and carried that any statements being made public by the Committee for Improvement of Child Health should be reviewed and approved by Drs. Wilson, Hill and Webb.

It was moved, seconded and carried that a representative of the Academy be empowered to place before the House of Delegates of the American Medical Association our resolution opposing S-1290 as written in the action taken at the February 1948 meeting.

It was moved, seconded and carried that the Committee to the American Medical Association be empowered to ask Dr. Harold H. Mitchell, Chairman of the Academy Committee on School Health, to accompany the Committee as an adviser during the conference with the Trustees.

A motion was made and seconded that Dr. Hubbard, as Director of the Committee for Improvement of Child Health, be encouraged and empowered to go ahead and seek funds for the Committee.

The following resolution was adopted by the Executive Board:

WHEREAS, the Executive Board of the American Academy of Pediatrics meeting in executive session composed of the representatives of each District except District IX, in Buffalo, April 29-30, 1948, has carefully explored the sentiments expressed by various members of the Academy for and against the recommendation of the Committee for Improvement of Child Health, endorsed by the Board at its special meeting on February 8, 1948, and

WHEREAS, the Executive Board feels that the majority opinion of the membership upholds its interim action on February 8, 1948, in accordance with its constitutional duties, in approval of the principle of federal support of pediatric education as a temporary measure, and

WHEREAS, the Executive Board recognizes the need of further study of the details of administration of such support before final action is taken, be it

RESOLVED, that the Executive Board reaffirms its previous action, and be it further

RESOLVED, that the Executive Board requests the assistance of the Committees on Legislation and Improvement of Child Health between the present date and that of the Annual Meeting in November 1948, to conduct through the Academy's journal, PEDIATRICS, and other channels, an informative and factual exposition of the exact reason for the recommendation for federal aid to pediatric education, and be it further

RESOLVED, that the State Chairmen of the Academy and the secretaries of the state medical societies be kept informed of the exact purposes of this project to which the Executive Board has given its approval, and be it further

RESOLVED, that the Executive Board direct its Program Committee to set aside an ample period during its Business Session at the Annual Meeting in November for discussion and final action by the Academy membership on the subject of this resolution, by which time the members will have had ample opportunity to understand the factual circumstances which activated the Executive Board in endorsing the recommendation of the Committee for Improvement of Child Health.

Those present and voting are the following:

Dr. John A. Toomey, President*
Dr. Warren R. Sisson, Vice-President (President-Elect)
Dr. Oliver L. Stringfield, District I Chairman
Dr. Paul W. Beaven, District II Chairman
Dr. Philip S. Barba, District III Chairman
Dr. Arthur H. London, Jr., District IV Chairman
Dr. Edward A. Wishropp, Alternate District Chairman (for Dr. Bruce)
Dr. George F. Munns, District VI Chairman
Dr. Thomas J. McElhenney, District VII Chairman
Dr. Vernon W. Spickard, District VIII Chairman

The vote follows:
Six (6) in favor, two (2) opposing, and one (1) abstaining.*

* Accompanying letter to the membership:

Attached is a copy of the resolutions adopted by the Executive Board in Buffalo. This office was instructed to include the statement made by Dr. Toomey when these resolutions were sent out. Dr. Toomey's statement follows:

"I would like to state that the Academy has adopted Robert's Rules of Order for the conduct of meetings, and the President has no vote except in the case of a tie.

I want it clearly understood that in case I had had a vote I would have voted against the resolution."

Sincerely yours,

CLIFFORD G. GRULEE, *Secretary-Treasurer*

The meeting was adjourned at 11:10 A.M., April 30, 1948.

Round Table Discussion

PEDIATRIC EMERGENCIES

JOHN AIKMAN, M.D., *Chairman, Rochester, N.Y.**

Chairman Aikman: Pediatrics and medicine in general are so full of emergencies that it is difficult to know which ones to consider. At times the line between medicine and surgery is not sharply drawn. The problems are different in various parts of the country due to social conditions, the local poisonous plants, insects, food poisonings, diseases and lastly customs of the people. The problems of Texas are in many ways different from those of New York. The ease with which emergencies develop make the physician humble, and the solutions of these problems require ingenuity, resourcefulness, and courage. Knowledge regarding these matters is almost impossible to secure on a minute's notice, especially outside of the hospital.

No emergencies present more variety and interest than the poisoning accidents of children. Here we have unusual, dramatic, and even fantastic problems presented for immediate solution and treatment. The constant introduction of new poisons into agriculture and industry is astonishing. Unfortunately, there is considerable lag before the danger of new chemicals is detected and effective measures for treatment found. The magnitude of the problems can be appreciated when we know that the California Agricultural Code has jurisdiction over nearly 5,000 materials introduced for pest control of all kinds. A large part of these may become a problem when brought in the reach of and in contact with the runabout child. The National Safety Council reports that poisoning was the third most important cause of accidental deaths in the home in 1944. Deaths from falls were 16,900, mostly in the aged; burns 6,300, about 30% in children less than five years of age; and 2,090 deaths were from accidental poisoning, 680 of these occurred in children under five years of age. In 1929 there were 530 deaths but in 1937 only 440 deaths were reported, 217 of which occurred during the second year of life. The increase in 1944 is probably due to the larger birth rate and to unsatisfactory living conditions.

Poisons will produce nearly every symptom from mild skin rashes to convulsions, coma and death. Poisoning may easily be mistaken for disease and the number of cases overlooked has been estimated as high as 80%. It has recently been pointed out that salicylate and especially aspirin may add confusing symptoms to those of the disease being treated. The amount of accidental poisoning in small children is impossible to determine because only the reporting of fatal cases is required. From newspaper clippings collected by the Manufacturing Chemists' Association, 550 cases of kerosene poisoning alone were found in this country between 1937 and 1946. Characteristic of these poisoning accidents, 69.5% occurred in children 13 to 24 months of age. Eighteen percent were fatal. Only these latter would have been reported to the health department.

Children are usually too young and too frightened to give reliable information; fearing punishment, they may even try to mislead. The possibility of poisoning should always be kept in mind.

Sudden loss of consciousness is always an alarming symptom but it may occur from inhalation of any of several solutions used in dry cleaning. Most of these contain carbon tetrachloride, but I have known of a fatal case which occurred when ether was also used. Carbon tetrachloride is twice as toxic as chloroform. It is also used in fire extinguishers. Gasoline or its vapors may produce cyanosis, convulsions, coma, and death. Unconsciousness due to carbon monoxide poisoning may be overlooked. When the patient is found in a closed garage or in rooms filled with charcoal or coal gas the diagnosis may be easy, but frequently very careful investigation is required to arrive at the right diagnosis, when the cause is not as evident.

Serious poisoning with ethyl alcohol is not commonly found but it may occur. Mild intoxication and even unconsciousness may be a confusing symptom in children who have emptied the cocktail glasses left by adults.

Bromide intoxication may produce puzzling neurologic symptoms even suggesting bulbar lesions.

The increasing use of barbiturates has introduced another dangerous sedative into the home. As with many other poisons the unpleasant taste does not necessarily deter the small child from taking

From the Annual Meeting of the Academy, Dallas, Tex., December 8-11, 1947.

* Deceased July 13, 1948.

a secret hurried overdose that may produce coma. Fortunately, many of the barbiturates have a wide range of safety. Recovery may occur after hours of unconsciousness. This has made it difficult to evaluate the many drugs suggested for treatment. Coma resembling diabetic coma may occur after overdoses of salicylates, especially after oil of wintergreen, natural or synthetic. It is a vicious drug to have around children. Cyanides have also produced collapse and death when small children have accidently come in contact with hydrocyanic gas which was being used as an insecticide.

Sportsman reports two cases of stramonium poisoning from eating datura stramonium or jimsonweed. Disorientation, delirium, amnesia, and other mental signs developed. Difficulty in swallowing and the plucking sign were present. "The diagnosis often depends on medical sleuthing."

Sedative tablets and cough mixtures may be drunk by children.

Poisons must always be considered when severe, unexplained convulsions occur. Attention was called several years ago to the fact that common cathartic tablets such as Hinkle's Cascara, A.B.S., or A.B.S.C. pills were the most common poisons causing fatal convulsions in children. There has been a reduction in this type of accident probably because home cathartics have changed due to radio and other advertising, and also because many cathartic tablets such as Hinkle's Cascara no longer contain strychnine.

While convulsions are characteristic of strychnine poisoning, overwhelming amounts of other poisonous agents will also produce convulsions often as a terminal symptom. Pyrethrum, sodium fluoride, arsenic, camphor, gasoline, kerosene, volatile oils, poisonous plants, and innumerable drugs have caused convulsions. Fortunately, the intravenous use of amytal and other barbiturates has reduced the mortality from strychnine poisoning. Profound collapse or convulsions may occur hours after pills or tablets intended for adults have been eaten by children. The drugs may be slow acting or slow to go into solution. Enteric coating may also delay the onset of symptoms.

Many drugs produce severe gastro-intestinal symptoms. Arsenic, probably the most common of these, is found in innumerable insecticides and rodenticides. Such arsenic poisoning is most common in California and the southern states. Sodium fluoride, found in insect powders, which also produces severe gastro-intestinal symptoms, has been mistaken for magnesium sulphate and whole family groups have been poisoned when it has been accidentally substituted for baking powder. Cathartics like "Ex-Lax" are also eaten as candy by the runabout child. Poisonous plants and mushrooms must be considered when unexplained diarrhea occurs in the country. Food poisoning is also a problem. Nicotine widely used as an insecticide produces severe gastro-intestinal symptoms and it also causes dyspnea, collapse, coma, and death.

Severe and alarming cyanosis may be produced in almost unbelievable ways. Occurring in the newborn infants in maternity nurseries, it has caused much alarm. It is due to aniline in the ink used in laundry marks. It occurrs when diapers are worn and wet shortly after marking. Such cases are still being reported. The same cyanosis may occurs when shoes recently dyed black are worn. The poison goes through the intact skin. Either aniline or nitrobenzene may be the cause. Jones, Swarthmore and Brieger report severe and prolonged cyanosis from paranitra niline in wax crayons eaten by a 38-month-old child. (Red orange crayon, "crayola" and "true-tone" crayons.) Cyanosis may occur after the use of bismuth subnitrate, when nitrite is formed in the intestine. Comly has recently reported several cases of nitrite poisoning and cyanosis in infants due to ingestion of water with a high nitrite content from poorly constructed wells in farm yards. Boiled water of this type had been used in formulas. I have seen two fatal cases of nitrite poisoning due to ingestion, by children, of tablets containing nitro glycerine, sodium nitrite and other drugs intended for adults. These tablets used in the treatment of "hypertension" may be enteric coated and delayed in action.

Atropine causes much confusion in pediatric practice. The flushed skin, fever, rapid pulse and respirations, dilated pupil or pupils and occasional abdominal distention must be kept in mind.

Thallium poisoning has been mistaken for encephalitis, and lead encephalitis may cause confusion.

Respiratory symptoms due to inhalation of zinc stearate, strong acid and other fumes and lastly from kerosene and other petroleum products may occur.

Unexplained nephritis, hematuria, and hemoglobinuria have been produced by drugs and foods. (Sulfonamides, vicia fave beans.)

In making a differential diagnosis in suspected poisoning the manufacturer, druggist, chemist, botanist, and general laboratory must come to our aid. When the content of some material is unknown, a telegram to the manufacturer often secures valuable information; don't write.

The first vomitus, the first lavaged material and a urine specimen should be saved for analysis. Examination of the blood, the stool and the spinal fluid may be required.

Spectroscopic examination of the blood will detect methemoglobin, carbon monoxide hemoglobin and some other poisons.

A photoelectric colorimeter is of value in determining the presence of lead, salicylates, thymol, potassium, bromides, and sulfa compounds. X-ray studies of the bone are valuable in lead and bismuth poisoning.

Roentgenologic, fluoroscopic, laryngoscopic, and bronchoscopic examination may be required to determine the damage done by some poisons such as lye and acids.

Treatment

The physician assumes responsibility in a poisoning case at the moment he is called, usually on the telephone. While some cases may be treated without seeing the child, it is foolish to advise emetics or other treatment if there is any chance of trouble. Delay is serious and the sooner the poison is removed from the body the better. Parents must be advised to remove the questionable case to the hospital immediately, there to be met by the physician. There is a medicolegal side to poisoning accidents. Great care should be used in giving telephone advice because trouble may result from improper or mistaken advice.

Emetics are slow and unreliable but may have to be used in some emergencies. Recently, the value of lavage has been questioned with the claim that large amounts of fluid promote passage of the poison into the intestine. This can be avoided by using repeated small amounts of liquid and removing the same by suction with a large glass syringe. In this way you can see the stomach contents and may also remove by pressure any small obstructing plugs from the stomach end of the tube. Symptomatic treatment is required in shock, pain, convulsions, coma and in respiratory failure. In the hospital, fluids intravenously and subcutaneously may be given, as well as transfusions of blood, plasma or concentrated red cell suspensions. Oxygen or oxygen and carbon dioxide may rescue the child when anesthesia, cyanosis or asphyxia develop.

It would be fortunate if there were an antidote for every poison but even advised antidotes are too frequently unavailable, unreliable or uncertain in action.

The war and the necessity of finding treatment for war gases has given us a valuable antidote in Bristish-Anti-Lewisite. This neutralizing agent for arsenic is also reported to be effective against antimony, bismuth, chromium, nickel, mercury, tellurium, copper, and gold. Here modern chemistry has definitely lessened the poisoning problem. Arsenic is so widely used in insecticides and rodenticides that it is a great problem with children and an effective antidote is a blessing. Woody and Kometani are reporting on the use of BAL in 42 cases at this meeting. They show how effective and how safe this agent is in counteracting arsenic from ant poisons. They advise its use in mild and even suspicious cases. The same may be said regarding mercury which is taken in medicines and in solutions for external use left within reach of the child; also from mirrors and fireworks. BAL may rescue the child with antimony poisoning who has been given tartar emetic in the place of cream of tartar. Unfortunately, BAL is not very effective in lead, thallium, cadmium or selenium poisoning, although it may have some effect with lead.

BAL 10%, with Benzyl Benzoate 20%, in peanut oil, is administered by intra-muscular injection; 2.5 mg./kg. is recommended at four-hour intervals for a total of four to six injections on each of the first two days. After that, two injections may be given for ten days or until recovery occurs. Larger doses (5 mg./kg.) are suggested in mercury poisoning. BAL must be given early to be of value. Every hour of delay lessens its value. In order to avoid delay it should be kept in every emergency room. BAL itself may cause local and general reactions and the pateint should be kept in the hospital while treatment is being carried on. Tye and Siegel report that ephedrine sulphate (25 mg. to 50 mg. adult dose) given by mouth shortly before BAL is administered reduces side reactions.

Davison, Crowe, Kernodle, and Taylor have reintroduced and improved the Bokay and Salzer Therapy of lye poisoning and in poisoning from other strong caustics. Due to the efforts of Chevalier Jackson and others the general incident of lye poisoning has been reduced. But in the large section served by Duke University it is still the custom among the poor people to use a solution of lye for a household cleanser as well as for the home manufacture of soap. The white

solution is left within the reach of the small child and is mistaken for milk. They have seen 136 cases, 82%, in the one to five year group.

The former treatment has been neutralization of the alkali with acids like vinegar, lemon, orange or grapefruit juice followed by the repeated administration of emollients like olive oil to the burned and eroded surfaces. Then waiting to see if swallowing becomes difficult. At Duke they aim to prevent the formation of strictures as follows: by the fourth day, unless it is shown by fluoroscopy and by direct visualization by a pharyngoscope—not an esophagoscope—that the esophagus has not been harmed, the Salzer or Bokay prophylactic therapy is introduced. "An eyeless (Bokay) catheter, size 10 to 30 (French), which has been filled with lead shot or mercury, tied off at the open end and wet with water or with K-Y lubricating jelly, (to avoid the possibility of lipid pneumonia from the use of greasy lubricants), is gently passed down the child's esophagus (not more than 2 cm. entering the stomach) and left in place for five minutes, once daily, starting on the third day after the child swallows the lye, or as near that time as possible. The catheter should not be forced but allowed to pass merely by weight of the shot of mercury contained in it."

If you are unable to obtain a Bokay catheter, the eye of an ordinary soft catheter may be closed by vulcanization. The catheter may be visualized by the fluroscope and should be passed daily, the size being gradually increased. It is left in place for from 10 to 30 minutes. Early and thorough treatment greatly reduces the incidence of stricture of the esophagus. With severe acid burns, the damage is more apt to be in the stomach.

Probably no insecticide has received more publicity and wider use than D.D.T. (Dichlordyhenyl-trichlorethane). Used as a dusting powder, space spray and in other ways it is to be found in the home and on the farm. It is frequently mixed with kerosene, pyrethrum, and even carbontetra-chloride. There is a wide safety margin when taken by children and the much publicized fatal case in South Africa was very suggestive of kerosene poisoning. Anoxia, muscular weakness, tremors, prostration, vomiting and convulsions may occur. Repeated exposure increases susceptibility to D.D.T. Calcium gluconate intravenously has been used successfully in treatment.

Salicylate Poisoning or intoxication is receiving considerable attention due to the attempt to give children large doses of salicylates in rheumatic fever. Recently, 13 cases of salcylate poisoning were reported from the St. Louis Childrens' Hospital, most of whom had received aspirin for colds. All showed a "metabolic acidosis" with a lowered pH and carbon-dioxide content of the serum. Erganian warns against these dangers in the administration of aspirin to children. It has taken years to evaluate the salicylates. The rate of absorption varies from methyl salicylate up to aspirin but all preparations, apparently, will cause poisoning. The onset and severity of symptoms seems to depend on the rate of absorption. As little as one teaspoon of oil of wintergreen may produce very early and even fatal symptoms. On the other hand large amounts of aspirin require hours to develop serious signs.

Ordinary food poisoning and food-borne infections seem to be less common in small children, who are less likely to be present at church suppers and other gatherings where large groups are poisoned by the custard and cream puffs and other pastries, creamed potatoes, creamed chicken, ready to eat ham and tongue, and other foods, contaminated usually by the Staphylococcus.

Entertoxin, incidence of milk-borne scarlet fever and so called septic sore throat are still reported in New York State. In milk-borne group infections children are often protected by the use of boiled milk.

I have never heard of milk sickness or trematol in New York State, but I am told that snake root occurs there. Hartman recently reported a case of this interesting condition in St. Louis in which acidosis was present. The snake root or jimmy weed is eaten by cattle and the poison trematol is passed on to man through milk and milk products. Severe gastrointestinal symptoms develop with epigastric pain and muscular pain. Children are usually protected by the heat treatment of milk.

This disease followed western immigration and proved a regular plague in parts of Ohio, Indiana, Illinois, and neighboring states. Whole villages were depopulated. Abraham Lincoln's mother died of the disease in 1818. Gowen reported 21 cases in Illinois in 1938.

While less trichinosis may occur because less poorly cooked pork is eaten, I have seen several cases of trichinosis among children of Italian families. In a group, in which one child died, the previous diagnosis had been rheumatism and in another group a fatal case had been diagnosed as meningitis. Here trichinosis was suspected and was found in other members of the family. The

fact that evidence of trichinosis will be found in a high percent of general autopsy material when search is made for the organisms, is a challenge to the diagnostic accuracy of the profession.

Mushroom poisoning must be suspected in severe unexplained gastro-enteritis and coma especially in Italian families, where the fly Amanita is frequently mistaken by immigrants for an edible mushroom of southern Europe. Atropine is advised in treatment. Poisoning may be fatal. Poisoning by Amantia Phalloides or Destroying Angel, is much more serious with mortality ranging from 60% to 100%.

Favism is caused by ingestion of the Vicia fave, *"broad bean,"* or *"jack bena,"* or by the inhalation of pollen from the blossoms by people having an idiosyncracy or allergy. 1,211 cases have been reported in the U. S. The sensitivity is sometimes hereditary and several generations in certain families have been affected. The symptoms occur in a few hours after inhalation, but after ingestion may be delayed a day or two. Vomiting, vertigo, chills, fever and loss of consciousness may occur. Jaundice, hemolytic anemia, *hemoglobinuria* and *hematuria* are the outstanding symptoms. Poisoning is more common in the adult but fatal cases have been reported in small children who have eaten raw fave beans. Nursing mothers have transmitted the disease to infants. Epinephrine is suggested for early shock and blood transfusions are indicated.

Perhaps a word should be said regarding the various bites that may occur.

Snake Bites: It is said that the larger the snake and the smaller its victim, the more dangerous is the effect of a bite. Small children need more active treatment.

A tourniquet should be promptly applied above the bite and must be partially released for a few seconds at five or ten minute intervals to restore the circulation. Morphine should be given for pain.

While Amarol advises against incision, others recommend that cross shaped incisions one-fourth of an inch long be made at each fang mark and at intervals about the bite. Surgical precautions and local anesthetic should be administered where possible. Suction by mouth or better by Bier's cups is indicated.

A concentrated antivenin (for the rattle snake, copperhead and moccasin) in 10 cc. syringes is now manufactured and available. For a child, the whole amount should be given subcutaneously and repeated if necessary. It may be used intramuscularly or intravenously (in desperate cases). North American snake venoms are slow in action; and treatment, even hours after the bite is valuable. Tetanus antitoxin should be administered. Fatal snake bites are very rare in the Northeastern states.

Ticks: Young children who have been playing in underbrush or bushes in suspected areas should be stripped and examined for bites. Do not pull out the tick. Crushing the tick increases the danger of infection. It is better to place a few drops of chloroform on the insect's head. If left alone the insect may drop off. Kerosene, mineral oil, or an ointment such as diachylon should be used in treatment.

Tick paralysis is found more often in children, especially when bites occur on the back of the neck, but Rocky Mountain Spotted Fever is our chief concern. We have had no experience with this but the problem has been present in Long Island, New Jersey, and Maryland. Many here are qualified to discuss snake and tick bites.

Flea and Fly Bites may be touched with tincture of camphor, a weak carbolic solution or calomine lotion.

Bees, Ants, Wasps, and Hornets: Remove the sting if possible. Weak ammonia or sodium bicarbonate solution locally. Hot compresses are also beneficial. Anaphylactic reactions may be combatted by adrenalin. Desensitization with whole bee extract made up in Coca's solution is advised before a subsequent exposure.

Black Widow Spider Bite: The Latrodectus Mactans or Black Widow is a common spider and has been found in every state except Vermont. Most of the bites occur at night in outside privies when the web of the spider is disturbed. Eleven of 24 cases reported by Kirby-Smith were bitten on the penis. Patients range from 14 months to 78 years of age. Severe pain in the abdomen, hips, back and lower chest may begin in from five minutes to two and one half hours. Pain in other portions of the body may develop. There is no local sign of the bite unless the fang marks, small red dots, can be seen. The abdominal pain has been mistaken for an acute surgical condition and operation performed. Fatalities are rare. Treatment: Noon advises an antivenin. Calcium chloride or calcium gluconate 10 cc. of 10% solution intravenously. Magnesium sulphate 10% solution intra-

venously or 10 cc. of 25% solution has been used intramuscularly. Phenobarbital and morphine may be required.

Although there are said to be nearly 500 plants that are poisonous to man, such poisoning is not common in Western New York. The deadly nightshade seems to have a wide distribution, but I have not yet recognized a case of poisoning. American false hellebore has been mistaken for marsh marigold, and the monkshood root has been confused with horseradish. Daffodil bulbs are poisonous. Shoots of the mountain laurel, bittersweet berries, and castor-oil beans may prove poisonous. The cowbane or water hemlock has been mistaken for wild parsnips. Cases of unexplained illness in the country or in camps should suggest the possibility of poisoning from this source. Advice of a botanist is advised.

Lead Poisoning—Chronic Lead Poisoning or the subacute form is more easily recognized because of improved methods of diagnosis. It should be suspected when anorexia, vomiting, abdominal cramps, and palsy occur; and a lead line appears on the gums. Lead encephalitis should always be kept in mind.

Much more could be said about poisoning accidents, but our time is limited. More may be added in the discussion.

We are fortunate to have Dr. Kennedy with us to discuss the great problem of convulsions and also to give his opinions regarding the thymus problem.

Dr. Roger L. J. Kennedy—Rochester, Minn.: I wish to introduce the subjects of status thymicolymphaticus and enlarged thymus which continue to be controversial, but I shall present my remarks in a noncontroversial manner.

Since the establishment of the Section on Pediatrics in the Mayo Clinic we have not observed an instance of either condition. We have seen a number of patients whose condition had been diagnosed enlarged thymus and to whom treatment had been given. However, other conditions were found by endoscopic or other methods of examination. We operate on many infants and children and have never given preoperative roentgen or radium therapy for an enlarged thymus.

In many roentgenograms of the chests of infants and children a wide upper mediastinal shadow may be seen. We are aware that a well-nourished infant or child will have abundant thymus tissue. We realize that the thymus is radiosensitive. We do not know what the function of the thymus may be.

A convulsion, regardless of etiology, is a symptom and not a disease. In the minds of parents a convulsion, particularly a first convulsion, constitutes an emergency and all physicians that care for children have received urgent calls to hurry to care for infants and children so affected.

Time will permit me to mention nonchronically recurring types of convulsions only and even this subject can be treated only sketchily. It is hoped that the most interesting facts regarding it will be brought out in the discussion.

Convulsions have been classified on several bases by McQuarrie, Peterman, Keith, Penfield, Cobb and others. It is convenient to consider their management according to both age of the patient and etiology.

Cerebral birth trauma, including asphyxia neonatorum, congenital cerebral defects, acute infections, both intracranial and extracranial, and tetany predominate as causes of convulsions during the neonatal period. By far the commonest cause is cerebral trauma.

When convulsions are due to cerebral trauma, cyanosis is present. In such cases oxygen, or oxygen and carbon dioxide, may be of help. Although many drugs may be employed, chloral hydrate in doses of 0.065 to 0.2 gm. administered per rectum continues to be a reliable agent. Pentobarbital sodium in doses of 0.016 to 0.032 gm, rectally also may be tried. If the fontanel is tense and bulging, spinal drainage is frequently effective.

Tetany during the neonatal and later periods of infancy may account for the acute onset of convulsions. Presence of Chvostek's and Trousseau's signs is reliable evidence of the underlying metabolic disorder. The finding of low values for serum calcium, of course, will substantiate the diagnosis. Although tetany is observed much less frequently now than formerly, because of the widespread prophylactic use of vitamin D, instances do occur. Parathyroid extract may be administered subcutaneously, but the oral or intravenous administration of preparations of calcium is generally routine. Ten cubic centimeters of a 10% solution of calcium gluconate may be given intravenously every four to six hours. Calcium chloride may be given orally or intravenously. When it is given orally, the initial dose is 3 to 4 gm. in a 10% solution in water or milk. Administration

of calcium and some form of vitamin D should be continued by mouth. Sometimes temporary use of chloral hydrate is desirable. It can be given orally or rectally in doses of 0.2 to 0.3 gm. to infants aged six months and less, and in doses of 0.3 to 0.65 gm. to older patients.

Convulsions are common at the onset of acute infectious diseases. If intracranial disease can be ruled out, antipyretic measures plus inauguration of treatment to control the infection may be all that is necessary. These measures may consist of baths, cold sponges or cold packs, enemas of cool tap water and drugs, such as salicylates. At times anticonvulsant drugs, such as chloral hydrate and pentobarbital sodium given rectally or intravenously, may be required. Not infrequently extracranial infectious diseases may stimulate meningitis or meningo-encephalitis and may cause convulsions. In such cases, lumbar puncture and spinal drainage may serve as a therapeutic as well as a diagnostic procedure.

Intracranial diseases, both acute and chronic, may cause the sudden appearance of convulsions. These diseases include meningitis, encephalitis, abscess, thrombosis, trauma, hemorrhage, malformations and tumor. In such cases treatment aimed at the control of seizures will be necessary in addition to treatment directed toward the underlying cause. For the most part anticonvulsant and sedative drugs, such as chloral hydrate and the barbiturates, will be found satisfactory.

In addition to infantile tetany and febrile convulsions, spontaneous parathyroid insufficiency and spontaneous hypoglycemia, especially the latter, are frequently considered to be the cause of convulsions. Actually, neither condition is of common occurrence. If a diagnosis of spontaneous parathyroid insufficiency is substantiated by the demonstration of low values for calcium and high values for phosphorus in the serum, the manifestations including convulsions can be controlled by oral administration of large amounts of calcium (2 teaspoons of dicalcium or tricalcium phosphate or of calcium gluconate three or four times daily) and relatively large doses of vitamin D in the form of cod liver or other fish liver oils or viosterol.

Spontaneous hypoglycemia due to a neoplasm of the pancreas will require administration of adequate amount of sugar to control symptoms until the neoplasm has been removed.

Various toxic states and agents can account for convulsions. Most prominent among these are tetanus, renal disease and poisoning with substances, such as strychnine. Time permits only brief reference to some of them.

The essentials of treatment of a child with tetanus are rest in bed, a minimal amount of handling, avoidance of all unnecessary stimuli, feeding through a nasal catheter, intravenous administration of solutions of salt and dextrose and of large doses (50,000 to 100,000 units) of tetanus antitoxin in saline solution by drip method and continuous complete sedation. Sedation may be accomplished by the usual anesthetic dose, 0.075 cc./kg. body weight of tribromethanol by rectum and at intervals of one to three hours by administration of 0.01 to 0.015 cc./kg. body weight. Sodium isoamylethylbarbiturate (sodium amytal) may be used instead. It is given intravenously in a 5% solution (5 mg. sodium amytal/kg. body weight) at a rate not greater than 1 cc. per minute.

Sodium ethyl (methylbutyl) thiobarbiturate (pentothal sodium) also can be used intravenously for its immediate effect. An initial dose of 1 cc. of a 2.5% solution may be administered and followed by doses of 0.5 to 1.0 cc. at intervals of 10 to 15 seconds. At the same time rectal administration of pentobarbital sodium in doses of 0.032 to 0.2 gm. should be started.

My experience with intocostrin has been limited and not encouraging.

A number of methods of treating uremic convulsions are in vogue. Lumbar puncture is carried out by some. A 2% solution of magnesium sulfate may be injected intravenously until the blood pressure falls to normal. Then large doses of magnesium sulfate in saturated solution should be given orally until the blood pressure stabilizes.

Poisoning as a cause of convulsions has not been mentioned as it is a major interest of the chairman.

Dr. Donald D. Posson—Rochester, N.Y.: Emergencies may and do occur in practically every phase of pediatric practice. I would like to talk about the emergencies not commonly seen but encountered just often enough so that we must keep them in mind. These are the emergencies due to physical agents. In addition to these it may be of interest to consider some of the accidents which may occur in office or hospital practice.

Sudden collapse or death from moderate trauma is occasionally encountered in children or babies. Many of these are very difficult to explain. There are probably many mechanisms of the human body, such as the carotid sinus reflex, which are as yet poorly understood that may cause death or

collapse. Farber has covered this field extensively. He feels that most of these can be explained by careful autopsies. He classifies them as:

1. Unexpected death caused by a congenital anomaly, i.e. heart, great vessels, cerebral hemorrhage, congenital aneurism, etc.

2. Unexpected termination of a known disease, i.e. overwhelming pneumonia, cardiac failure, etc.

3. Unexpected death in infants and children previously in good health, i.e. streptococcus, meningococcus or pneumococcus infections.

4. Unexpected death in the neonatal period, i.e. cerebral hemorrhage, aspiration pneumonia, etc.

5. Sudden death for which no cause can be found, i.e. hypoglycemia, anaphylactic reaction, hyperactive carotid sinus reflex, etc. He discounts the thymus as a cause of sudden death.

By far the most important causes of accidental death in infancy are anoxia and asphyxia. This subject is one which has interested me since medical student days, when my first-born son was nearly smothered in a hood lined with silk. He had turned his face around into the hood and some mucus from his mouth had cut off his air supply. Since then I have had three or four infants under my care who were found dead, supposedly smothered by bed clothing. Other babies have been strangled by bed harnesses, caught between the rods of the bedside with the trachea compressed, choked on foreign bodies such as marble, toys, coins and loose objects about the house.

Davidson reported 358 infants who suffocated in bed in England and Wales during 1942. Both Werne and Woolley believe that suffocation by bed clothing rarely occurs. They are of the opinion that even the smallest babies have the ability to lift or turn the head enough to get air.

Abramson has reported the mechanical suffocation of 139 infants under one year of age in New York City from 1939 to 1944. 85% of these were under six months of age. 68% were found in a face down position. 17% were face up, and 15% were suffocated by the mother's arm or breast as she lay beside the baby in bed.

It is rare that anything can be done for these infants. They are dead when found. It seems to me that we can prevent some of these by advising:

1. That no baby under three months should be allowed to sleep face down unattended.

2. That the bed clothing be so arranged that the baby's neck cannot be caught or that he cannot pull the clothing over his face.

3. That he should not be allowed to nurse when the mother is lying in bed and likely to fall asleep.

It should be emphasized, however, that the diagnosis of mechanical suffocation with its implication of carelessness on the part of the parents or attendants should never be made unless all other possible sources of death are ruled out.

Accidental drowning under four years is comparatively rare, 10% of the total accident deaths as compared to the suffocation figure of 17% according to the figures of the National Safety Council. These cases do occur, however, particularly in the youngsters over a year. Toddlers fall into the bath tubs, toilets, fish pools, washtubs, and shallow ditches as well as into deep water. One case of mine nearly drowned when he splashed bath water into his own face while inhaling. Only prompt artificial respiration by the mother saved his life. Again prevention is far more important than treatment. A very short submersion is often enough to cause death in an infant or small child.

Every fish pool in a neighborhood where small children play should be fenced in. Toddlers about docks and deep streams or in boats should wear life jackets even if under the constant eye of the parents. A few seconds in the water are too many. Artificial respiration by the prone pressure or tilting methods and cardiac stimulants such as 0.06 to 0.3 gm. of caffein are the usual treatments.

Electric shock, although rare, does occur. A case has recently come to my attention in which a 17-month-old boy stood on a hot air register and grasped a defective electric light cord in his hand. He was found by his father lying unconscious with his face against the register, the cord still in his hand. Artificial respiration was given by his father and adrenalin was given within five or six minutes by his physician. The pulse and temperature were elevated for several hours, but he survived with only a face burn to show for his experience. I have known other children to bite into electric light wires and to push metal objects into wall plugs with resulting shock and burns.

Another unusual case recently seen was that of a six-year-old girl who was struck by lightning under a tree. She was knocked unconscious, became very cyanotic and immediately went into a

convulsion. She vomited repeatedly. She remained unconscious for three hours and had several convulsions. The next day she was restless and had hallucinations. Some spasticity of the left side of the body was found and an electroencephalogram showed "dysrhythmia similar to that seen with cortical injury." She was treated with dilantin and apparently recovered.

Kotkis has divided electric shocks into those caused by high tension and low tension currents and lightning. The high tension current carries 2200 or more volts with 50 or more amperes. The low tension curent is of 110 to 115 volts with 10 amperes.

One dangerous practice which is quite prevalent among children is to set the radio close to the bathtub so that they may listen to their favorite programs while taking their baths. In case of a short circuit in the radio this may easily prove fatal because of the grounding of the current through the large area of the body exposed to the bath water.

Great care must be used in releasing the patient from the current. Artificial respiration should always be used whether the patient seems dead or not. Caffein and adrenalin should be used and oxygen and carbon dioxide inhalations as soon as available.

Sunstroke and heat stroke are common emergencies in some localities: Heat stroke is characterized by a high temperature from 105 to 112 degrees.

Cessation of perspiration, delirium, coma, twitching and convulsions may be found. Treatment consists of ice packs, electric fan, cold spray etc. A temperature bounce down to 97 degrees with collapse must be watched for and avoided. Salt and water replacement are indicated.

Heat exhaustion causes no temperature rise. The patient is cold and faint. Stimulants, external heat, fluids and salt are needed.

More common in our latitude is freezing, usually of the hands, feet, nose, ears, cheek and chin. Many small children freeze a spot under the chin because of a combination of saliva drooling from the mouth and poor circulation caused by a tight chin strap attached to the hood. Slow thawing is indicated. Mothers should be warned that the parts will freeze more quickly the next time because of the damage to the blood vessels.

General freezing is uncommon. It requires artificial respiration, warmth and stimulants.

Burns are one of the most common groups of accidents seen in pediatric practice, 25% of fatal accidents under four years. I will mention the subject only to make a plea for intensive propaganda by the pediatricians for preventive measures. Care in the kitchen and bathroom where hot liquids, hot metal or flames and children come together will save many hours of pain, disfiguring scars and lives. I have had four cases of burns in which the mother tried to pour hot water into the end of a bathinet while the baby was on the tray on top. As the baby kicked, the water was accidently poured onto the tray where it ran down under the back and buttocks. One of these scalds was fatal. Another source of danger is inflammable material from which play suits and Halloween costumes are made. Another hazard is the tinfoil icicle used to decorate Christmas trees. These will cause a flame if they fall onto the charged track of a toy electric train—as I learned one Christmas time when my daughter's dress caught fire in this fashion. The treatment of burns is a large chapter itself, and I will not attempt to discuss it here.

A word about sunburn is also in order. Many parents are so careless as to allow small children to become dangerously sunburned. It has always seemed to me that some penalty should be imposed by law on such people. I think that local pediatric societies should recommend to the officials in charge of public beaches that the life guards should make it their duty to protect children against severe sunburn as well as against drowning.

Some of the more common office and practice accidents have been described in the discussion of allergy. Almost anything injected into a child may cause a severe immediate reaction. As our vaccines and sera are becoming more refined, these accidents become fewer. Broken needles in the flesh require prompt attention, often to the point of calling in a surgeon to probe for the needle. A thermometer broken in the mouth is usually spit out promptly, but one broken in the rectum recently gave us considerable trouble.

Accidental intravenous injection of a substance meant to be subcutaneous or intramuscular must be guarded against by always pulling back on the plunger of the syringe before injecting—a procedure that we often neglect.

Overdoses and wrong medication are bugbears which eternally haunt us. Atropine is a drug in which the individual tolerance varies so greatly that a dose which has no effect on one child may be a toxic dose for another. Overdosage with sulfa drugs is common, either because of

misunderstanding or poorly given directions or because the mother has administered them without consulting the physician. Salicylate poisoning is not uncommon in the treatment of rheumatic fever. Adrenalin is often given in much larger doses than necessary. 0.2 or 0.3 cc. of a 1 to 1000 solution should rarely be exceeded in children, even in emergencies.

Therapeutic accidents due to wrong medication have occurred in some of our local hospitals. In one instance boric acid solution was given subcutaneously instead of saline solution. Wide surgical incision of the areas was done as soon as the accident was discovered but the baby succumbed to the poisoning. About two months ago there were three deaths in premature infants in a hospital in Delaware, where alcohol was given subcutaneously. The bottle had contained saline solution and when empty was filled with alcohol without changing the label. In another tragic instance babies were killed by the accidental substitution of powdered boric acid for sugar in their formulas. All of us must be accident minded at all times and insist that our hospitals use every precaution to prevent such tragedies.

Transfusion reactions are becoming less common with the improvement of methods and increasing knowledge of blood subgroups. It is of interest that our proposed Regional Blood Bank of the Rochester District which the National Red Cross is sponsoring, will use disposable transfusion outfits to lessen the reactions.

Aspiration accidents, pericardial, pleural and cysternal must be mentioned. Lumbar puncture should be done with caution in the presence of increased intracranial pressure and is often best left undone.

In conclusion may I make another plea for the pediatrician to let no opportunity go by to spread the gospel of safety to the parents of their patients. Point out every danger spot. Quote cases of fatal accidents. Frighten the parents if necessary to make them remember your warnings. Too many accidents are happening to too many children.

Chairman Aikman: We are fortunate to have in the audience, Dr. Digby Leigh of Vancouver, B.C. Dr. Leigh has made a special study of anesthesiology as it concerns children and is about to publish a book on the subject. It has some very interesting views in regard to anoxia and also in regard to anesthesia.

Dr. Digby Leigh—Vancouver, B.C.: I would like to give you our approach to some of these important problems. We have had little tiny babies to anesthetize and, after all, when you give a patient an anesthetic agent you are really poisoning him—it isn't just oxygen or water—and they become unconscious. First of all, if you have a patient to be anesthetized, do not give any food before the operation. I have known of many cases where food was vomited and aspirated, resulting in death. If you must give some nourishment, use a solution of corn syrup or something like that. Most patients die on the operating table because of obstruction to respiration.

The next point of importance is the occurrence of convulsions during anesthesia. This often occurs in cases of acute appendicitis—it is hot weather, the patient's body temperature goes up on the operating able, and a convulsion takes place. There are two types of convulsions under anesthesia. First is the type that you get during the induction of anesthesia—sometimes due to the anesthetic agent, itself, or to too much CO_2 with a big mask.—A little bit of asphyxia and children just convulse very quickly. That type is not nearly so dangerous as the one you get in the acute appendicitis case. It is a hot day, lots of towels are used, and for some reason or other they must put six blankets on in hot weather; and the patient's temperature goes up. I saw a patient whose temperature went up from 101° to 108° on the operating table.

Dehydration is a very important factor and if the body temperature goes up, the thing to do is to keep the patient cool and give intravenous fluids. We like to use some other agent which does not give quite as much acidosis. We increase the acidosis with ether by creating a lot of lactic acid. Eaton and Ranzone showed that ether produces an enormous amount of lactic acid, which in turn increases the metabolic acidosis and the patient is just on the verge of convulsion. Most important of all is prophylaxis—try to have the patient hydrated, keep all the heavy drapes off, and keep the temperature down. Sometimes we use other anesthetic agents if we can. In fact, for the occasional method, ether is still the best, but for those who do a great deal of children's anesthesia, other methods that produce much less acidosis are preferred.

Another thing I would like to mention is that some means of artificial respiration should always be at hand. In an emergency, what I prefer to mechanical means is to get a good airway, clear out

the air passage and blow in with my own mouth, because I have 14% oxygen in my air. I don't worry about the bacteria, because this is an emergency; so we just blow gently and look down and watch to see if the lungs come up and are just gently inflated. The results are remarkable. Now, if you want to get a little higher oxygen, breathe rapidly for a minute and you put in about 16 or 17%. Speed is very important. In regard to passing in a stomach tube, sometimes a patient stops breathing when a stomach tube is passed. There is reason for this in that when you pass it there is a vagal reflex in which respiration will cease.

Dr. J. Victor Greenebaum—Cincinnati, O.: For many years I have taught senior students in the pediatric course in Cincinnati to be alert to the possibilities of emergencies in infancy and childhood that can be found by physical examination and laboratory tests. The mother easily recognises a convulsion, a severe burn, or a hemorrhage, which naturally are emergencies. The point that I make is that there are other emergencies for which something must be done at once which are not evident to the parents. For instance: Head and Neck—A foreign body in the nose and respiratory tract, otitis media, retropharyngeal abscess, larynx, K.L. or edema, meningitis and poliomyelitis. Chest—Pneumonia, empyema. Abdomen—Pyloric stenosis and pylorospasm, intussusception (volvulus), appendicitis, hernia (strangulated), pyelitis. Extremities—Subluxation head of radius, osteomyelitis. General—Diabetic coma, acidosis alkalosis, dehydration.

I particularly stress the importance of taking off the diaper in order to examine for inguinal hernia to avoid embarrassing situations after a visit to the office. Incidentally, these are the conditions I consider every time I examine a child.

Dr. Moore—Tyler, Tex.: Has Dr. Kennedy had any experience with sudden death in giving intravenous calcium gluconate? I was concerned about some work in reference to giving calcium chloride by mouth rather than intravenously because of the possibility of heart block.

Dr. Kennedy: We have not had such an experience. We are more inclined to use calcium chloride. If a baby is not vomiting and is able to take things by mouth, oral administration is still a pretty good way to give food and medicine. After much discussion of electrolyte balances at the meeting of the Society for Pediatric Research this year, the fact was emphasized that we are so scientific that we must give everything parenterally. One of the men, at the conclusion of the meeting, very pointedly said, "Well, we have learned a great thing today, and that is that the mouth is a good way to administer food and fluids." We all feel, it is true, that confronted with infants in convulsions, we would like to get as prompt an effect as possible, and we know that the intravenous route will give us, as a rule, more prompt results than will administration by mouth. But, just as soon as the initial control has been achieved, we should administer the drug by mouth.

Dr. S. G. Babson—Portland, Ore.: What is the easiest way to induce vomiting? Lots of times when a child has taken certain things that we know are not fatal, one doesn't like to rush them to the hospital to wash out their stomach. However, a method of bringing the stuff up that is quick and easy would be useful.

Chairman Aikman: The easiest way to induce vomiting is to put your finger back in the throat and tickle the pharynx. This will produce vomiting about as quickly as anything. One of the surest ways of inducing vomiting is by the use of apomorphine, but usually when the accident occurs apomorphine or other such emetics are not available. Mustard has been given for years to produce vomiting.

Question from the floor: Dr. Leigh, what is your method for bringing about cardiac arrest?

Dr. Leigh: The first thing to do for cardiac arrest is to use a proper anesthesia. Don't overdose the patient; don't let him get obstructed; and watch him all the time. If you follow this you will see few cases of cardiac arrest. I have seen two cases of cardiac arrest with ethyl chloride. In the first one, they got the heart going again, but it was too late. There had been too much anoxia and the patient died in about a week as though he were decerebrate. We had another one and used cardiac massage. Hamilton and Bailey have reported 40 cases of cardiac arrest on the operating table, and three cases lived and were normal out of the 40. Whatever you do must be done in a minute and a half. Cardiac massage is artificial circulation—let's hope we don't have many of those. In the hands of the expert ethyle chloride is all right. Most of the trouble results from an overdose. It is not a matter of cardiac fibrillation; the heart gradually slows down and stops beating. Artificial respiration alone, blowing into the lungs is usually adequate to get the heart beating again. The most dramatic anoxia is cardiac arrest because no oxygen is getting to the patient and

the main thing to do first is inflate the lungs and let someone else run for the adrenalin or whatever else you are going to use—by then it doesn't matter, but get some oxygen into those lungs and I think that may stimulate the heart.

Dr. J. E. Brown, Jr.—Columbus, O.: We have all had the experience at about 11 o'clock at night of being called by some mother, whose child would not take aspirin or sulfadiazine, but who at that hour proceeded to swallow an unknown amount of somebody's lacquer, or indelible ink, or it could be most anything. Then the problem arises, first, how much has been taken, and then how noxious or toxic is it? You then ask the mother for the list of ingredients that may be printed on the can or bottle. Four times out of five, no such information is available. Thereafter, to the best of your ability, you endeavor to have the child vomit at home; very possibly you may send him to the hospital to have his stomach washed out. Is there any standard text which does not list proprietary remedies, but which lists things under the heading of shoe polish, lacquer remover, paint thinner, etc., so that you can have an idea of what to do, and what basic poisons may be in that particular preparation?

Chairman Aikman: I have been trying for years to find out the common poisons that doctors run into and to look up treatment that would be adequate. This is a hobby, the most nonlucrative hobby anybody could get into. The results are recorded in Chapter 17, Vol. I of Brennemann's "Practice of Pediatrics," edited by Irvine McQuarrie. I would suggest that the general index be consulted. It is next to impossible to cover everything that a child may take by mistake. Study the subject as much as you may, and the next doctor who calls you for advice will have a new problem. "Economic Poisons" published by the California Department of Agriculture, lists 5000 insecticides, rodenticides, etc. This gives an idea of the magnitude of the problem and it does not consider the thousands of other items that may be nonpoisonous but which are a problem until this fact is discovered. Physicians and hospitals would be of great assistance if they would report these accident problems and experience in their management. This is especially true when new drugs produce serious toxic signs. If you are up against a case of poisoning and you do not know what the article contains, and you cannot find out, put the responsibility on the family. Advise them to take the child to the hospital and have his stomach washed out. This has two effects, one is that it relieves your mind and the second is that the child very rarely takes anything like that again. One experience is usually enough.

Dr. W. A. McGee—Richmond, Va.: Dr. Posson mentioned skin testing under six, that it shouldn't be done, as quoted by Wall, and I agree with that. A child ought not to be punished by direct skin testing. It should be done intradermally, but if they are going to do intradermal skin testing on any age child, do the scratch test first and you'll save yourself a severe reaction or possibly a fatality. We are advised to start with a dosage of .05 cc. of 1 to 50,000 solution. That is an awfully strong dose to start with. Begin treatment with the smallest dose that doesn't give any local reaction and sometimes even weaker if you think you're getting a reaction. I have a scheme of coloring the bottle like the rainbow—with a red label for the strongest bottle, orange next, then green, and so on to violet as the weakest. In treating patients having angineurotic edema, your antigens are often contraindicated because they are very sensitive patients and they flare up very easily.

As a preventative measure, if we would not start with multiple foods but use single ones you will avoid a lot of trouble. Wait five days before giving the food a second time and another interval of three days before using it regularly. In this manner it is possible to avoid offending foods. If you continue to give them, you might get into trouble. I've seen a near death from orange juice—the mother gave it one day and the next day gave it again. You wouldn't think of those things as being dangerous, but any food can be dangerous. Where you know you have an allergic family, and your history should tell you that, proceed with new foods cautiously. I think if we will watch and introduce foods singularly and slowly we are less apt to get dangerous reactions and you get more information which will prevent eczema and other unpleasant disorders. Egg white should NEVER be introduced under a year. I was guilty of introducing egg yolks early, but I have quit that. Most of us give foods less rapidly, realizing that the body is better able to handle them at a later time. One other thing I would like to comment on is—you see children occasionally that are coughing and the mothers say they are coughing terrifically and they can't stop it. They have the respiratory types of allergy—you know that from the past. If you give them a shot of adrenalin early, you'll prevent pneumonia, which so often follows if you wait too long.

Chairman Aikman: Dr. McGee, I'll ask you to explain some of this anaphalactic shock. Neither Dr. Kennedy, Dr. Posson nor myself have said anything about it. We know it is present—the children die suddenly.

Dr. McGee: Some of us feel that that reaction is probably the nearest thing to the human anaphylaxis that you can get. It is like the animal that does not have allergy but anaphylaxis. The nearest approach to a human angle of anaphylaxis is the reaction when giving a vaccine, grown in egg white, to children who are egg white sensitive. You had better be sure that you haven't got an egg sensitive patient because you are going to get a fatality or at least alarming reactions.

Chairman Aikman: I have a note here, asking for a remark about tick paralysis and another one regarding lead encephalitis, produced by the fumes of burning battery boxes. I believe that the first report regarding this type of lead encephalitis came from Baltimore. The resident physician, curious as to how the poisoning had occurred, made an investigation in the colored section of the city. An old colored preacher suggested that the trouble might have come from the covers of discarded battery boxes being used as fuel and that was exactly the way the children had acquired lead poisoning. It was a very beautiful piece of work.

Dr. F. B. Schley—Columbus, Ga.: Late last winter, near early spring, we had two or three unconscious Negro patients to die right quick and didn't know what was wrong with them. Then one came in who lived long enough for us to get a history, and we found a lead line in his gums. We investigated and found his neighbors had been buying battery boxes at the junk yard and burning them. It was found that children who sat in front of the open fire and were closest to the fumes were the ones that were effected most. We had about three or four deaths, and a few got well.

Also we have seen evidence of tick paralysis and have had a case of Rocky Mountain spotted fever in Georgia. This was proven and it came from some of the western cattle that were sent into Georgia during the drought.

Dr. J. C. Jaudon—St. Louis: We have occasionally encountered an unusual emergency when we give blood with an excessive amount of citrate. A few babies have shown hypocalcemic symptoms, sometimes collapse, and convulsion during or immediateyl after such a transfusion.

It is hard to understand why one baby who has taken well water gets methemoglobinemia and the next baby who has ingested like amounts of nitrite from another well does not. Cooke has isolated a non-pathogenic organism, and believes that this must be present in the intestinal tract of well water before nitrate is absorbed in sufficient amounts to produce methemoglobinemia. It is not necessary to transfuse a baby with methamaglobinemia when the intravenous administration of methylene blue is all that is necessary.

Chairman Aikman: A Pathologist told me the other day that this ability that bacteria have to convert nitrates into nitrites is one of the methods used for identifying some bacteria.

Dr. Kennedy: I should like to say a word about excessive nitrates in the wells. In Minnesota we had a few instances of cyanosis caused by nitrates in well water. The State Board of Health has a program for checking all the wells in the state. This is an extensive program, involving bacterial as well as chemical analysis. The idea is to approach the problem by looking for excessive nitrate in the water, and at the same time obtaining information regarding infected wells.

Dr. Greenebaum: Twenty years ago in Cincinnati we had an experience of five children turning blue. We published it among the first publications on that subject. There was a man from New Orleans Childrens Hospital by the name of Graybar. One night he phoned from New Orleans and they had ten babies that had turned blue—he remembered the Cincinnati experience and told the fathers, and they didn't believe him. He called me and I backed him up.

Dr. R. C. McGahee—Augusta, Ga.: I would like to say a word about the prevention of accidents from the administration of oil by mouth. Two children have been seen with pneumonitis following the careless administration of cod liver oil. The mother thought that the best time to give the oil was when the child was crying. Also several children have been seen who had aspirated a foreign body into the lungs while running across the room with the article in the mouth.

Pediatrics

VOLUME 2 AUGUST 1948 NUMBER 2

SPECIAL FEATURE SECTIONS

THE PEDIATRICIAN AND THE PUBLIC

EDWARDS A. PARK, M.D., *Editor,* PAUL HARPER, M.D., *Associate*

INTRODUCTION

A MEETING of the Maryland members of the American Academy of Pediatrics was held on June 17, 1948. All 16 members who were present signed the following statement on the recommendation for federal support of pediatric education which was approved by the Executive Board of the Academy in Chicago, February 8, 1948. Nine other members have subsequently signed this statement. There are 30 active members of the Academy in Maryland, from whom five have not been heard.

PAUL HARPER

A STATEMENT BY MARYLAND MEMBERS OF THE AMERICAN ACADEMY OF PEDIATRICS

We, the undersigned members of the American Academy of Pediatrics, wish to comment on the recommendation of the Committee for Improvement of Child Health of the American Academy of Pediatrics that federal tax funds be used for the support of pediatric education[1] This recommendation was approved by the Executive Board of the Academy in Chicago, February 8, 1948.

One reservation should be stated at the outset: it is our opinion that tax funds for the support of medical education should be allocated to strengthen medical training as a whole, not to bolster any one specialty field. However, it is clear that the Academy of Pediatrics is qualified by virtue of its nationwide study of pediatrics training to present the current situation in pediatric education but is not so qualified with regard to other fields of medical education. The recommendations of the Academy could be so worded as to acknowledge the larger problem and yet emphasize its pediatric aspects. Practical steps have already been taken in this direction by action of the Executive Board of the Academy in appointing a group to confer with the American Medical Association and with the Association of American Medical Colleges for the purpose of developing mutually acceptable recommendations.

The Academy in its Study of Child Health Services focused attention not upon past achievements in pediatric care and education but upon our current shortcomings and deficiencies. The solid progress that has been made in the medical care of children

in this country over the past half century can be a source of real pride to the entire profession, and it may be stated without qualification that children in these United States of America are better cared for than ever before. But the purpose of the Academy is not to be a mutual admiration society—the important question is whether American children are as well cared for as it is possible. The evidence is clear that they are not. This is due in part to shortages of physicians with pediatric training, particularly in rural areas, and in part to deficiencies in current pediatric education. The relative shortage of trained medical personnel in rural areas is too well known to require elaboration here—although this point will be re-emphasized repeatedly as the various state reports of the Academy Study of Child Health Services are released.[2]

The recent study of pediatric education conducted by the Academy of Pediatrics provides the best index to our need for more and better pediatric training. General practitioners provide about three quarters of all visits to children. About 66% of the general practitioners in the country filled out the Academy questionnaire and nearly half of them report having less than one month hospital training in pediatrics.[3] This situation is improving as evidenced by differences in training between older and younger physicians; even so, data from Maryland show that 23% of the men in general practice who are under 45 years of age report less than one month in hospital training and no post-graduate work in pediatrics after leaving medical school. Among the pediatricians themselves, nearly one-quarter report less than one year in hospital work in pediatrics following medical school.

Most departments of pediatrics in the 70 medical schools operate on grossly inadequate budgets; over one-third of these departments work on teaching budgets of less than $10,000 a year, and nine have less than $5,000.[4] This situation is not surprising, for pediatrics is a very young specialty; and the majority of departments of pediatrics are only about 25 years old. But this excuse, valid as it may be, does not alter the fact that the pediatric training of medical students and house staff is seriously handicapped by lack of funds, and that organized post-graduate training in child care for the general practitioner does not exist on any large scale.

The Academy study points up the advantages of extension of pediatric teaching services from medical centers to affiliated and out-lying hospitals. About 170 hospitals have been approved by the American Medical Association for pediatric residencies with several of these added during the recent effort to expand this type of training. Many of these hospitals do not have adequate budgets for teaching nor do they meet the numerical demand for this type of training. This demand can be met if outlying hospitals which cannot now meet the requirements for residency training are enabled to do so by affiliation with the teaching hospitals of a medical school. Such a program would provide for the rotation of fellows and residents from the pediatric department of medical school through periods of service in the affiliated hospital; it would also provide for consultants and teaching staff from the medical school to visit the affiliated hospitals from time to time.

Such extension of medical training has proven so successful in a number of places*[5, 6, 7]

* Extension training plans which have operated successfully include those sponsored by the Rochester Regional Health Council, Rochester, N.Y.; the plan for a two year general residency between affiliated hospitals and the University of Michigan Medical School, Ann Arbor, Michigan; the plan of the Bingham Associates at the Tufts Medical School, Boston, Mass.; and a similar plan at the University of Minnesota.

that its value and practicability is now unquestioned. In Maryland, for example, one or more of the larger county hospitals might seek such a connection with the University of Maryland Medical School; others might arrange a similar program with the Johns Hopkins University Medical School. Such a plan has extraordinary potential value. The fellows and residents who would be assigned to the outlying hospitals would benefit from contact with the problems of practice as conducted away from medical centers. The attending physicians at these hospitals could expect the care of their patients to be improved by the presence of a full-time assistant resident pediatrician working under their direction. The physicians in the affiliated hospital would be stimulated by their responsibility to teach the resident staff and in other ways the association would be mutually valuable. The teaching of the intern staff at these hospitals would be promoted by the fellows and residents and this fact should aid these hospitals to acquire highly qualified interns. There would be more positions for residents in training at the University of Maryland Medical School and at the Johns Hopkins University Medical School and so ease the demand for such training.

This extension type of training has in most instances received financial support from a number of foundations on a pilot study basis. The success of these pilot programs justifies the expansion of such programs.

The recommendations approved by the Executive Board of the American Academy of Pediatrics call for a program in three parts:

1. Fifty percent of the recommended funds to be allocated to medical schools to add to the budgets of their pediatric departments. The primary purpose here is to strengthen undergraduate pediatric education.

2. Thirty percent of the funds to be allocated "for the support of pediatric education not included in the above paragraph, such as grants for (1) scholarships or fellowships, (2) expenses for staffs of pediatric departments when visiting affiliated or outlying hospitals—" and other more general recommendations.

3. Twenty percent of the funds for pediatric fellowships of six months' duration or more to be allocated for graduates who agree to return to the state to practice in designated areas. The purpose here is to give pediatric training to both general practitioners and pediatricians who will agree to practice in areas of need.

The recommendations also provide for a strong Advisory Council on Pediatric Education. This council will be comprised of nine pediatricians, three to be chosen from a panel nominated by the American Academy of Pediatrics, three to be chiefs of pediatric departments in medical schools, and three to be chosen at large.

The recommendations are a broad statement of purpose, and so allow a desirable latitude to the administrator and his Advisory Council. It is clear from the total report of the Committee that it was their intent that funds under these recommendations should be used among other purposes for the extension of pediatric training to hospitals affiliated with teaching centers. However, there is no mention within the recommendations as now written of an extension program of pediatric training, and the Academy might wish to be more specific in this regard.

It is probable that there will be little quarrel with these aims. The problem is how to get financial support for such a program on a nation-wide scale without loss of local and individual freedom in educational matters. Income from endowments has fallen and costs are steadily rising until medical schools, which are one of our most costly educational endeavors, are now in serious financial straits. Private philanthropic funds

have been dried up by inheritance taxes and income taxes. State tax funds provide chiefly for state institutions and are of little help to the privately endowed schools. State tax funds may be sufficient in the wealthier states, but clearly are not able to finance adequate medical training in the less-favored states. This leaves federal tax funds as the only feasible means of effecting adequate support of medical education on a nation-wide basis. If federal taxes have dried up the sources of endowment, then it seems only logical for federal funds to assume some share of the burden of medical training.

The objection that federal tax funds will encourage centralized control of medicine is based on the proposition that if you give the devil an inch he will take several yards. This argument has a certain value, but its extreme application would result in our refusal to enter upon any progressive course of action simply because such action entails some risk.

Safeguards to protect the freedom and initiative of physicians and of medical institutions can be and should be written into the law. This Academy should examine the safeguards in this and other proposals for federal support of medical education, and if it thinks necessary should make recommendations and exert pressure for their strengthening. It should be one of the self-imposed duties of the Academy to be continually vigilant in this regard. The Academy might amend its recommendations to require the advisory committee to prepare an annual report which shall be published by the federal agency and thus assure that the advice of the advisory committee shall not be quietly filed and forgotten.

The use of federal tax funds to support an educational program does not automatically indicate federal control. The important fact is that taxes at local, state or federal levels all come from our own pockets, and our only assurance that taxes at any of these levels will be spent effectively and wisely in our own watchful activity. Certainly the medical profession has the obligation and the right to sit in judgment on that area where its opinion is authoritative; namely, that expenditures for medical education shall be made intelligently, wisely and efficiently.

The argument that federal support of medical education will set a new pattern is not factual. Such a pattern already has been set. Federal tax funds have been used to support research and teaching in venereal disease and in various aspects of tuberculosis for years. The National Mental Health Act currently provides about one million dollars a year to support education of mental health personnel, and the National Cancer Control Act carries a larger amount for such education. The Children's Bureau is currently authorizing about one million dollars a year in Social Security Funds for training of personnel and in connection with educational institutions in the maternal and child health and crippled children's fields. Sixty-four of the 70 medical schools are currently receiving research grants from the U. S. Public Health Service and such projects often have teaching value.

The legal language used by Congress in authorizing many of these grants is designed to prevent federal interference with medical education. Pending legislation under the National Mental Health Act stipulates that block grants shall be made to approved medical institutions. This means that any of the 70 approved medical schools may obtain such a grant without dictation by the federal administrator of their teaching policies. The matching of federal funds by the medical school is also an assurance of local responsibility for educational policies.

There is urgent need for a nation-wide, physician-sponsored program to improve

medical care. The public demand for more medical care and for its better distribution cannot be satisfied by the statement that medical care is now adequate. It is to the credit of the profession that many local medical groups have acted to improve local medical service, but there is no professionally-sponsored, effective, country-wide program. The demand for such a program is not a local phenomenon; it is world-wide, and in many countries it has been strong enough to demand and receive action. Unfortunately, the physicians in many such countries have maintained a persistent, negative attitude toward this public demand with the result that laymen with more knowledge of political pressures than of medical needs have drafted legislative programs which have been imposed by popular vote.

The public and their political representatives have been interested chiefly in the availability and in the cost of medical services. The overwhelming importance of quality and the need for protection of such intangibles as the patient-physician relationship which has been too often neglected in other countries, should become the platform and the goal of the profession in this country. It is our view that the adoption of a positive position by the physicians of this country for the improvement of medical care through better medical training will put the profession in a strategic position for future leadership.

It may be wise to remind ourselves that any action which we may take in this matter is merely the expression of our opinion in a manner which is open to any group of citizens. It is unlikely that Congress will act favorably on a recommendation by this Academy unless it is convinced that such action is in the public interest.

Summary

The recommendations that federal tax funds be used for the support of pediatric education which were prepared by the Committee for Improvement of Child Health and approved by the Executive Board of the American Academy of Pediatrics are supported with the following reservations:

a. The recommendations of the Academy should acknowledge the need to strengthen the entire field of medical education while maintaining the Academy's qualification to speak for the pediatric aspects.

b. The recommendations should more clearly emphasize the desirability of extending medical training by an affiliation between outlying hospitals and medical centers. The purpose is more and better training in pediatrics for general practitioners as well as for pediatricians.

c. The recommendations should be amended to strengthen the position of the proposed advisory council on medical education and to require that there shall be no interference with academic freedom to develop medical education and to investigate disease.

Herman J. Dorf
Harry D. Bowman
Robert A. Bier
Samuel S. Glick
Harold H. Mitchell
Clewell Howell
Paul Harper
C. Loring Joslin
Edwards A. Park
A. H. Finkelstein
D. C. Wharton Smith
John A. Askin
Wilson Grubb
Gilbert W. Rosenthal
S. Butler Grimes
John S. Fenby

William C. Stifler, Jr.
Karl W. Ebeling
Caroline A. Chandler
Frances E. M. Read
Gibson J. Wells
Joseph M. Cordi
Fred B. Smith
J. H. Mason Knox, Jr.
J. Edmund Bradley

REFERENCES

1. Special report from Committee for Improvement of Child Health: federal support for pediatric education, PEDIATRICS 1:387, 1948.
2. Sisson, W. R., et al, Total volume of medical care for children based on an analysis of eight states, PEDIATRICS 1:227, 1948.
3. Hubbard, J. P., and Zibit, S., Review of private practice: Pediatricians and general practitioners, PEDIATRICS 1:379, 1948.
4. Mitchell, J. M., et al, Impressions on pediatric education, PEDIATRICS 1:512, 1948.
5. Proger, S. N., Medical education and care, Hospitals 20:48, 1946.
6. The regional hospital plan—first year's experience, The Council of Rochester Regional Hospitals, Rochester, N.Y., 1946, p. 30, et seq.
7. Wilkinson, C. H., Jr., Hospitals' new role as Michigan decentralizes, Hospitals 21:48, 1947.

TRENDS

IN HEALTH LEGISLATION AND ADMINISTRATION

By JOHN P. HUBBARD, M.D., *Contributing Editor*

This and subsequent descriptions of events and trends are intended to be unbiased and factual, presenting both sides of controversial matters so that conclusions may be formed from critical appraisal of things as they are. These statements do not necessarily reflect the opinion of the writer nor are they to be interpreted as official opinion of the Academy.

WHEN the National Health Assembly was reviewed in this column a month ago, the report of the Maternal and Child Health Section was reserved for a full description. Since this section report, along with many of the other section reports, is still in the process of final revision, further discussion of the National Health Assembly will be postponed until next month.

CONGRESS AUTHORIZES FEDERAL PROGRAM FOR RESEARCH AND TRAINING IN DISEASES OF THE HEART AND CIRCULATION

In March we reviewed briefly two House bills (H. R. 5087 and H. R. 5159) to provide for a National Heart Disease program. Subsequently, a companion bill S. 2215 was introduced in the Senate by Senators Bridges, Pepper, Ives and Murray. This bill has now been cleared and has received the presidential signature. Thus there is created a new program which promises to develop into one of the biggest ever undertaken by the Public Health Service.

Under provisions of the National Heart Act there will be created a National Heart Institute which will be housed in the $40,000,000 clinical research center to be erected at Bethesda, Md., adjoining the present buildings of the National Institute of Health. The new law will also create a National Advisory Heart Council, composed of federal medical service representatives and 12 additional members appointed by the Surgeon General with the approval of the Federal Security Administrator.

This program has been strongly backed by the American Heart Association. Dr. T. Duckett Jones, appearing for the Association urged the adoption of a budget, the break-down of which is of considerable interest:

REQUIREMENTS FOR A NATIONAL HEART INSTITUTE

Control grants to State[1]	$ 3,000,000
Special trainees in cardiovascular diseases[2]	1,000,000
Research fellowships[2]	1,000,000
Assistance to medical schools for teaching[1]	1,750,000
Construction of research facilities[3]	3,500,000
Research grants[4]	3,750,000
Information center and administration[5]	250,000

[1] Similar to grants under National Cancer Institute.

[2] 200 traineeships at $5,000 per annum; or 100 research fellowships at $5,000 per annum for a minimum period of two years.

[3] This sum to be kept available until spent.

[4] $1,875,000 to cover needs for one year, but amount is doubled so as to provide for some stability for research grants.

[5] Note that this is less than 2% of entire requested appropriation.

National Heart Institute (intramural research)[6b]	550,000
Preparation and distribution of antistreptococcus typing serum[6a]	100,800
Epidemiologic studies[6a]	100,000
Demonstrations[6a]	119,110
Technical development[6a]	57,859
Survey of research and clinical facilities[6b]	125,000
Total	$15,302,769

In the words of Dr. Scheele, the Surgeon General:

"These measures would clarify, supplement, and extend our present statutory authority in the cardiovascular field. They would accomplish these objectives through several tested and valuable methods.

"First, they would provide specific authorization for a National Heart Council. On this council would be represented outstanding scientists and physicians in the cardiovascular field and public-spirited laymen with an active interest in heart-disease problems. This would provide the Public Health Service with the most excellent advice available for the conduct of the program.

"Second, they would provide a program of grants-in-aid to medical schools and to other institutions for the support of improved teaching in the cardiovascular field in a manner similar to the program now being administered by the National Cancer Institute. This we have found to be extremely valuable in marshalling the teaching facilities available in the country in the field of cancer, and I am sure we can expect similar results for diseases of the heart and circulation.

"Third, they authorize assistance for postgraduate clinical training in heart disease, which will improve the teaching and assure that the results of research will be available to practicing physicians.

"Fourth, in setting up a National Heart Institute in the Public Health Service, these bills would assure appropriate emphasis on research on heart diseases in a research center within the Service.

"Fifth, and especially important, these bills would provide a substantial program of financial assistance to research institutions outside government to promote heart research and to expand clinical and laboratory facilities for heart research. Also they would provide research training for young scientists.

"Sixth, each of these measures, but particularly H. R. 5087 and H. R. 5159, would authorize a program of control to supplement the basic research. Such a program is, of course, as vital for the actual and potential victims of heart disease, as well as for community health programs in general, as are the research provisions themselves. These bills would enable the States, with financial and consultative assistance from the Public Health Service, to set up programs of heart-disease control, detection, and prevention. We consider it highly desirable that these two aspects of the full heart-disease program; namely, research and control, be combined in a single agency. This will not only assure coordination of the two components of any comprehensive heart-disease program but will serve to shorten the lag between basic and research services for the people, which is our ultimate goal in the field of public health.

"Finally, these bills, if enacted, would make clear the will of the Congress to single

[6] Present 1949 allowance in United States Public Health Service budget, or the amount needed for 1949. (a) Present allowance. (b) Where additional amounts are requested.

out heart diseases for special consideration, and would serve to focus greater public attention on these diseases. Our experience with other health programs has proven that public sentiment is mobilized, that private and professional agencies are encouraged, and that the most practical and effective approach to the prevention and control of disease is adopted when such action is taken by the Congress. Recent experience in cancer detection, control, and research is a noteworthy case in point. Simultaneously with the expansion of the Federal program there has been stimulation of private agencies to a high level of activity, and as additional Federal funds have been made available, more private donations have been made than ever before. . . ."

PUBLIC HEALTH, NURSING AND MEDICAL SOCIAL WORK

LEONA BAUMGARTNER, M.D., *Contributing Editor*

THE STRUCTURAL NECESSITIES FOR LOCAL HEALTH SERVICE

HAVEN EMERSON, M.D.

OF ALL the specialties of medical practice none has contributed more than pediatrics to the two basic purposes of public health service; namely, the building of healthy minds in healthy bodies, or the guidance of growth and development of children; and the control of preventable diseases, especially those of nutrition and the acute communicable diseases of childhood. The obstetricians and general practitioners have done almost as much in their spheres of influence to advance the safety and length of life.

In spite of the contributions of physicians in general, and of certain specialties in particular, there is a widespread indifference to and practical ignorance of the administrative structure upon which almost all the voluntary efforts and independent professional resources of our communities must rest for practical and continuous constructive results.

For the moment we shall ignore the potential accessary benefits which may in the decades ahead accrue from the World Health Organization, in which our country is quite certain to participate. We recognize that our federal and state governments are not authorized by law to conduct the health departments of cities, counties, towns, villages or any other jurisdictions of local government except to meet an emergency resulting from neglect and incompetence of local authority and in view of the fact that the federal and state health administrations can and should supplement but not replace local health services. With these qualifications in mind we can briefly review the present status of local health services today in the United States, describe the accepted desirable functions and organization of such health services, and suggest remedial action for some of their major inadequacies.

State statutes permit, authorize and encourage local governments to establish local boards and departments of health. Of the approximately 38,000 units of local government including those of the 3,070 counties, about 18,000 have developed local health departments with or without related boards of health. Competent professional opinion indicates that not more than 1,200 local health units would suffice for all useful purposes to cover the total area and all the population of continental United States.

The six basic services of a local health department are included under the following functional headings:

Vital statistics	Public health laboratory service
Communicable disease control	Maternity, infant and child hygiene
Environmental sanitation	Public health education

Without the performance of the functions included under the above headings no preventive medicine for the good of a community can be carried on.

The better these six basic services are conducted the more effective can be the result of the contribution of local physicians to the preventive aspects of their private patient relationship, and the greater will be the influence of the voluntary health agencies upon

the habits and conditions of the people. Medical social workers and family case work agencies concerned with relief and prevention of poverty, as well as physicians and visiting nurses dealing with the sick, are dependent to a large extent upon a competent local health department for best results with cases, patients, and the associated families.

As of July 1, 1947 there were not less than 41 million people in the United States living in communities which have no local health department worthy of the name. Not more than 67% of our people have even the most elementary basic local health service, with full-time professionally trained medical officers of health and some at least of the indispensable associate personnel, such as sanitary or public health engineers and public health nurses.

When one measures the competence of such health departments by the criteria of quality and quantity of personnel, i.e. medical, nursing, sanitary, and clerical at least, it appears that not more than 5% of our national population lives under a local government where the tax funds provided and the standards of competence and number of personnel employed permit really efficient and economical service.

Just what is meant by such a measure of efficiency without waste or extravagance? The curious reader will have to consult the proceedings of the recent National Health Assembly (Washington, D.C., May 1-3), various reports of the U. S. Public Health Service, and the publication "Local Health Units for the Nation," by The Commonwealth Fund, 1945, which presents for each county and every state the desirable personnel for competent local health departments, as prepared by the American Public Health Association.

Briefly the Subcommittee on Local Health Units of the Committee on Administrative Practice of the American Public Health Association presents in its report, "Local Health Units for the Nation," the consensus of the professional workers in public health as to what constitutes a modest but adequate local health department to perform the six basic functions.

The unit of population should be not less than 50,000 and under no conditions less than 35,000 even where great distances and low concentration of population per square mile prevail, as in parts of several of our western states.

There should be available from tax resources, preferably local, but in case of communities economically disadvantaged supplemented by state and federal tax money aid, not less than $1.50 per capita to support the local health department.

For a unit of 50,000 population there should be employed the following 16 persons, devoting full time to this public service:

A medical officer of health, professionally trained and with administrative experience. His salary should be not less than the average net income of good internists or surgeons of the community.

A sanitary or public health engineer and an assistant sanitarian of non-professional grade.

Ten public health nurses of whom one would be supervisory grade.

Three persons of secretarial or clerical grade.

Such provision of nurses (10 per 50,000 population) will suffice for administrative public health nursing and health education only, not for bedside care of the sick.

There are two major present hindrances to the prompt completion of local health organizations to bring all our area and people within the scope of modern public health services, and these are shortages of trained professional personnel and lack of either authority to raise the required tax resources to meet this modest health budget, or under-

standing of the value and content of public health services, or the will of elected officials of local government to appropriate the $1.50 per capita required to pay for the services of a modern health department.

Seven states are now organized for total coverage by local health departments, but lack some of the necessary personnel. As much as 95% or more of the population of some states (California, Michigan, Florida) is already within local jurisdictions, county, city-county or multi-county health units. In some states (Iowa) less than 5% of the population is provided with local health departments meeting reasonable standards of competence. Ten states still lack permissive legislation to facilitate the collaboration of adjacent counties to form multi-county units for public health services. The New England States and New Jersey have provision only for cooperative action among the towns.

A bill now before the Congress would provide grants to states to be applicable for aid to counties unable to meet the cost of adequate public health service. This bill sponsored by the Congress of Parents and Teachers and endorsed by the American Medical Association, the American Public Health Association, by some 60 national health and civic associations and by the Social Security administration would facilitate the development and support of local health departments without weakening local initiative and responsibility.

The local health department is the retail distributing point for all the special programs of health protection and promotion, e.g. mental hygiene, cancer, heart disease, etc., as well as the main source of public information and control for all the standard official health functions. Without good local health departments under full time professionally trained leaders, the whole structure of public health becomes little more than a lip service to the sciences of preventive medicine.

FOUR WEEK SUMMARY OF COMMUNICABLE DISEASE INCIDENCE

May 23-June 19, 1948

THE accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in Public Health Reports under the section "Incidence of Disease." The table gives the number of cases of these diseases for the four weeks ended June 19, 1948, the number reported for the corresponding period in 1947, and the median number for the years 1943-47.

Diseases Above Median Incidence

Poliomyelitis: The number of cases of poliomyelitis rose from 440 during the preceding four weeks to 759 during the four weeks ended June 19. Of the total cases Texas reported 268, North Carolina 128, California 108, Iowa 36, Florida 16, New York, Nebraska and Louisiana 13 each. No more than 10 cases were reported from any other state. For the four weeks under consideration the number of cases was 4.5 times the incidence in 1947 and 3.2 times the median for the preceding five years (237 cases). Since the beginning of the current year, however, the number of cases (1,706) has been only 1.6 times the number reported for the same period in 1947 and 1.2 times the incidence in 1946. An increase of this disease is expected at this season of the year, but the current increase apparently began earlier than in preceding years, and was larger than has normally occurred.

In each section of the country except the New England, Middle Atlantic and East

South Central sections the incidence was considerably above the median for the preceding five years. For the country as a whole the current incidence was the highest since 1934 when 911 cases were reported for the corresponding four weeks.

Measles: The number of cases of measles dropped from 114,983 during the preceding four weeks to 96,060 for the four weeks ended June 19. However, the incidence was almost three times that for the corresponding period in 1947 and 1.6 times the median for the preceding five years. The incidence was higher than the median in all sections of the country except the West North Central, the increases ranging from 1.1 times the median in the New England section to 3.6 times the median in the West South Central section.

Diseases Below Median Incidence

Diphtheria: For the four weeks ended June 19 there were 563 cases of diphtheria reported as compared with 655 for the corresponding four weeks in 1947 and a median of 703 cases for the preceding five years (1943-47). The incidence was above the median in the New England, East South Central, and Mountain sections and lower than the median in the other six geographic sections. For the country as a whole the current incidence was the lowest reported during these same weeks in the 20 years for which data are available in this form.

Influenza: The 2,869 cases of influenza reported for the current four weeks was 72% of the 1947 figure for these same weeks and about 80% of the median for the preceding five years. In the South Atlantic section the number of cases (1,092) was 1.3 times the seasonal expectancy and in the West North Central sections the incidence was about normal, but in all other sections the numbers of cases were relatively low.

Meningococcus meningitis: The incidence of meningococcus meningitis continued to decline. For the four weeks ended June 19 there were 231 cases reported. This figure was slightly below the 1947 incidence during the corresponding weeks and was only about 36% of the median for the preceding five years. However, the 1943-47 median includes three years of unusually high incidence of this disease, and a better comparison is made with the average incidence for nonepidemic and minor epidemic years, which is approximately 200 cases for the period corresponding to the four weeks under consideration.

Scarlet fever: While the number of cases (6,194) of scarlet fever reported during the current four weeks was slightly above the low level of 1947, it was only about 60% of the median for the preceding five years. The incidence was below the seasonal expectancy in all sections of the country. Although the increase over the 1947 figure was slight, it was the first time since the week ended November 3, 1945 that the number of cases for a current four-week period was larger than the number for the corresponding period in the preceding year.

Smallpox: Not a single case of smallpox was reported during the four weeks ended June 19. During the corresponding period in 1947 there were nine cases reported and the 1943-47 median was 25 cases. This is the first time in the 20 years for which data are available in this form, and probably the first time on record, that there has been a four-week period without a case of this disease being reported.

Typhoid and paratyphoid fever: For the four weeks ended June 19 there were 293 cases of these disease reported, as compared with 310 during the corresponding four weeks in 1947 and a median of 323 cases for the same weeks in the preceding five years. The West South Central section alone reported an increase over the seasonal expectancy. Of the 94 cases occurring in that section Texas reported 62, Louisiana 16, Arkansas 10,

and Oklahoma 6 cases. For the country as a whole the current incidence was the lowest in the 20 years for which these data are available.

Whooping cough: The number of cases (5,736) of whooping cough reported during the current four-week period was less than 40% of the 1947 incidence and about 56% of the median for the corresponding period in the preceding five years. The West South Central section reported a few more cases than might normally be expected, but in all other sections the incidence was relatively low.

Mortality, All Causes

For the four weeks ended June 19 there were 34,981 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The average number for the same weeks in the preceding three years was 34,911 deaths. For the first and third weeks the number of deaths was below the preceding three-year average, but during the second and fourth weeks the numbers were lower than the three-year average.

REPORTED CASES OF 9 COMMUNICABLE DISEASES IN THE UNITED STATES DURING THE 4-WEEK PERIOD MAY 23–JUNE 19, 1948, THE NUMBER FOR THE CORRESPONDING PERIOD IN 1947, AND THE MEDIAN NUMBER OF CASES REPORTED FOR THE CORRESPONDING PERIOD, 1943–47

Division	Current period	1947	5-year median	Current period	1947	5-year median	Current period	1947	5-year median
	Diphtheria			Influenza[1]			Measles		
United States	563	655	703	2,869	3,988	3,479	96,060	32,926	59,394
New England	34	45	21	4	6	11	6,930	6,301	6,301
Middle Atlantic	77	107	103	13	31	26	28,612	6,000	8,342
East North Central	65	81	125	51	167	148	19,951	8,726	11,186
West North Central	51	57	57	38	19	30	2,837	4,665	3,519
South Atlantic	89	90	108	1,092	1,624	871	7,695	2,685	4,621
East South Central	56	79	45	81	293	153	1,602	1,006	1,006
West South Central	79	104	143	1,354	1,445	1,532	7,165	1,402	1,990
Mountain	62	30	50	179	293	293	5,536	1,198	1,839
Pacific	50	62	97	57	110	110	15,732	943	6,293
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	231	243	639	759	168	237	6,194	6,118	10,123
New England	12	9	36	0	4	5	1,016	568	1,415
Middle Atlantic	48	51	145	27	12	24	1,727	1,942	3,175
East North Central	40	52	142	25	10	13	2,042	1,790	2,639
West North Central	20	19	64	76	14	5	329	469	669
South Atlantic	23	29	88	166	19	43	289	335	690
East South Central	18	33	49	20	13	21	119	132	197
West South Central	39	22	56	298	23	62	134	114	188
Mountain	6	5	11	26	8	8	119	223	419
Pacific	25	23	48	121	65	55	419	545	757
	Smallpox			Typhoid and paratyphoid fever			Whooping cough		
United States	0	9	25	293	310	323	5,736	14,715	10,203
New England	0	0	0	18	6	23	303	878	878
Middle Atlantic	0	0	0	31	38	36	698	2,292	1,959
East North Central	0	2	5	21	47	35	564	2,481	1,687
West North Central	0	0	5	16	18	18	285	778	418
South Atlantic	0	1	1	57	48	61	1,148	2,174	1,792
East South Central	0	4	3	31	39	42	407	698	518
West South Central	0	2	2	94	74	74	1,504	3,651	1,252
Mountain	0	0	3	11	7	19	389	453	453
Pacific	0	0	1	14	33	26	438	1,310	1,310

[1] New York, North Carolina, and Pennsylvania excluded; New York City and Philadelphia included.
Data furnished by the Division of Public Health Methods, United States Health Service.

NEWS AND ANNOUNCEMENTS

The American Pediatric Society announces election of the following officers for the coming year: President—Jean V. Cooke, St. Louis; Vice President—Lawson Wilkins, Baltimore; Sec'y-Treas.—Henry G. Poncher, Chicago; Rec. and Ed.—Stewart H. Clifford, Brookline, Mass.

Chairman of the Council will be A. Ashley Weech, and the newly elected member to the Council is John D. Lyttle.

The Society's 1949 meeting will be in Atlantic City, May 3. It will be a joint meeting with the Society for Pediatric Research.

Newly elected members to the Society are: John M. Adams, Minneapolis; James M. Baty, Brookline, Mass.; Leona Baumgartner, New York, N.Y.; Charles C. Chapple, Philadelphia; John P. Hubbard, Washington, D.C.; Franc D. Ingraham, Boston; Roger L. J. Kennedy, Rochester, Minn.; Edith M. Lincoln, New York, N.Y.; Charles D. May, Minneapolis; Victor A. Najjar, Baltimore; William A. Reilly, Little Rock, Ark.; L. Nelles Silverthorne, Toronto; Myron E. Wegman, New Orleans; and Irving J. Wolman, Philadelphia.

* * *

Newly elected officers of the Society for Pediatric Research for next year are: President—Sidney Farber, Boston; Vice President—Francis F. Schwentker, Baltimore; Sec'y-Treas.—Robert Ward, New York, N.Y.

The following new members have been elected to the Society: William Berenberg, Caroline A. Chandler, Lewis L. Coriell, Edward C. Curnen, Albert Dorfman, Alfred C. Florman, Horace Gezon, Benjamin M. Kagan, Nelson K. Ordway, John L. Peck, Gertude C. Reyersbach, Margaret H. D. Smith, Alex J. Steigman, Stuart S. Stevenson, Grant Taylor, and Paul V. Wooley, Jr.

* * *

Temporary approval has been extended by the Council on Medical Education and Hospitals of the American Medical Association to the residency in pediatrics offered at the University of Arkansas Hospital, Little Rock, Ark. This action has been taken in concurrence with the American Board of Pediatrics which has indicated its acceptance of the University's two-year training program.

* * *

J. Roswell Gallagher, School Physician, Phillips Academy, Andover, Mass., is to direct a research program in adolescence, which has recently been given support by the W. T. Grant Foundation. The investigations will be in the fields of orthopedics, psychology and physiology. It is contemplated that a yearly grant of $10,000 will be continued for a period of five years.

INTERNATIONAL NEWS AND REPORTS

Pediatricians in the Union of South Africa recently have formed a group within the Medical Association of South Africa to be known as the South African Paediatric Association. This new group has been officially recognized by the Federal Council of that Medical Association. Chairman is Dr. Basil Melle; Sec'y-Treas. is Dr. Seymour Heymann—both of 195 Jeppe St., Johannesburg, South Africa. The twofold purpose of the new organization is: (1) To promote all aspects of child health and child welfare in South Africa including pediatric research, the furtherance of post-graduate pediatric study, the extension of undergraduate pediatric teaching in medical schools, the development of clinical pediatrics, and the extension and broadening of hospitals and institutions dealing with sick children. (2) To promote the professional and legitimate interests of pediatricians.

* * *

The babies of England and Wales broke two records last year. The highest birth rate in twenty-six years and a new low for infant mortality and stillbirths were set. The Registrar-General's report shows a birth rate for 1947 of 20.5 per 1,000 and infant deaths 41 per 1,000.

BOOK REVIEWS

GIVE YOUR CHILD A CHANCE, Lenore Turner. $1.50, 167 pages. The Georgian Press, Inc., 175 Varick Street, New York, N.Y., 1948.

This book adds another volume to the many already published on the subject of child care. Its preface and foreword are written by Donovan J. McCune, M.D., and Norvelle C. LaMar, M.D., respectively, who endorse the author's statements.

There is little in the way of advice to which I would not subscribe. In fact it is remarkable that so many pages can be filled with so much advice which is highly acceptable. Miss Turner has done a masterful job of summarizing the liberal ideas of our times. However, one begins to doubt the efficacy of any book so full of instructions without an adequate discussion of the "whys" of liberal ideas.

If one wants to recommend an encyclopedia of "do's" and "dont's", here is a good one from the liberal standpoint. However, it lacks the philosophic background which is so badly needed to change the attitudes of parents toward their children.

C. ANDERSON ALDRICH

THE PATHOLOGY OF NUTRITIONAL DISEASES, Richard H. Follis, Jr., M.D., $8.50, 291 pages, 71 illustrations, 8 tables. Charles C Thomas, Springfield, Ill., 1948.

This timely book is unique in its emphasis on the too frequently neglected morphologic aspects of the many different disease entities caused by dietary deficiencies. At the same time it presents the specific roles and the biochemical relationships of the various essential nutrients as well as the physiologic disturbances which characterize each deficiency state. The author's approach to the subject is thoroughly scientific, all statements and illustrative material being derived from controlled animal experiments or unquestionable clinical sources.

The line between the known and the unknown, between demonstrated facts and theoretic considerations, is always made apparent in a manner which serves to intensify the reader's interest in this rapidly growing field and at the same time charts the course for future scientific explorations. The bibliography consisting of 791 papers carefully selected from several thousand which have been published on the subject within recent years will serve as a reliable guide for those who seek more extensive information.

From the clinician's viewpoint it might appear on first sight that too great a proportion of the illustrative and text material has been drawn from the results of experiments on lower animals. Obviously such selection is unavoidable in a systematic presentation of the specific effects of individual deficiencies of the essential nutrients because many of the deficiency states described have not as yet been observed in man. Furthermore, dietary deficiencies, which occur spontaneously in the human subject, are practically always multiple and are, for that reason, more complicated than the experimentally induced single deficiency. Undoubtedly many of the observations made in animals only up to this time will ultimately be revealed in the human subject as well.

The illustrations, type and physical make up of the book are excellent.

IRVINE MCQUARRIE

OFFICE MANUAL FOR THE MEDICAL SECRETARY, Evangeline Markwich, Ph.D., Agnes Erickson, M.A., and M. Herbert Freeman, Ph.D., $3, 401 pages. The Gregg Publishing Company, New York 16, N.Y., 1947.

Books of this sort serve a dual purpose; first, to instruct and direct the medical secretary, and second, to help the doctor to review and correct his own ideas and methods, not only for his own personal benefit, but also to understand the needs in his office and business work and those many finer details which make for comfort and ease. This in turn, reflects a better doctor-patient relationship. The crowded medical curriculum can spare no time for such training of physicians nor is a hospital training experience a suitable period for such instruction. The doctor must learn, therefore, the hard way.

This book is authoritative, is written to meet the needs expressed by physicians, is well illustrated, and has a good bibliography. Much of the material is important for reference. A short chapter on laboratory technic and training is the only reference to medical service and there is no encroachment on nursing service.

THE BABY'S FIRST TWO YEARS, Richard M. Smith, M.D., Sc.D., 5th Ed. $2.75, 181 pages, 12 illustrations. Houghton Mifflin Co., Boston, 1948.

The new edition, after eleven years. Rewritten to conform with recent knowledge. A standard book for recommendation to parents.

1947 YEAR BOOK OF PEDIATRICS, Edited by Isaac A. Abt., M.D., Sc.D., with Collaboration of Arthur F. Abt., M.D. $3.75, 454 pages, 91 illustrations. The Year Book Publishers, Inc., Chicago, 1947.

This 1947 edition is dedicated especially to Dr. Isaac A. Abt, the senior author, on the occasion of his eightieth birthday. He has been Editor for 46 years. Notes have been prepared by Dr. Julius H. Hess, a pupil and associate of Dr. Abt, by Dr. A. Ashley Weech, and an unusual note by Dr. E. F. Ellis, who has the remarkable distinction of having received continuously every copy of the Year Book since Dr. Abt has been editor. His tribute to Dr. Abt can be applied in part to the Year Book. It indicates a record of usefulness through many years to physicians everywhere and in many professional segments outside of pediatrics. The publishers are to be congratulated as well as Dr. Abt. The present edition is up to the usual standards of quality, and it is obvious that its future is secure. It is an only book of its kind.

HISTORY OF THE CHILDREN'S HOSPITAL OF DENVER, COLO., John W. Amesse, M.D. 95 pages. The Children's Hospital Association, Denver, 1947.

This is a delightful record of the development of an institution from its beginning. It makes one feel the institution is living and has a soul for the author talks of people and what they have done, and he makes the people talk of what they are doing. The author's own personality is cast heavily in shadow across the whole picture. It is good to have a written record of such a past, for the glory of the present hospital may not reveal what has gone into its accomplishment. The author has succeeded admirably in recording such a useful story.

STETHOSCOPIC HEART RECORDS, Album No. CM-735, Revised Edition, George M. Geckeler, M.D. $6.00, Columbia Records, Inc.

Of interest to all physicians, teachers and medical students. Four, double-faced, twelve-inch records have been recorded for teaching purposes. The sounds include almost all types of auscultatory findings. The arrhythmias, particularly the illustration of doubled and tripled prematures, were checked electrocardiographically. Specific types of abnormalities are presented and described, using frequently the normal for comparison.

Records have been produced so that they may be listened to best with a stethoscope. This is a revision of Columbia's album No. CM-600. The recording is on ordinary material, surface noise is minimum, and sounds are very clear.

It would be hard to estimate the damage done when a cardiac murmur is classified incorrectly, leading to an improper diagnosis of heart disease. A great deal of this could be avoided if physicians use such recordings as these as standards for comparison. If a cardiac diagnosis is based on a murmur or on an arrhythmia, and it often is, then the evidence should be absolutely accurate.

NUTRITION OF THE NEWBORN (SAUGLINGSERNAHRUNG), 2nd Ed., Prof. Dr. August Reuss. $1.75, 128 pages. 13 charts and illustrations. Springer-Verlag, Wien 1, 1947.

A brief text book description of the feeding and care of the young infant. Little attention is given to the new concept of relating nourishment, care and feeding to the psychologic and environmental factors as well. Breast feeding is emphasized and management of the mother is discussed.